



# Gobi Regional Economic Growth Initiative

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## **Year Two - Third Quarter Report July 8 - October 7, 2005 Cooperative Agreement # 438-A-00-04-00002-00**

**Submitted to the U.S. Agency for International Development**

**By**



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## **GOBI INITIATIVE PHASE II – YEAR TWO - SECOND QUARTER REPORT**

### **INTRODUCTION:**

The Gobi Regional Economic Growth Initiative-Phase II (Gobi II) project began on January 8, 2004, funded under Cooperative Agreement #438-A-00-04-00002-00. The project is being implemented by Mercy Corps in partnership with Pact, Inc.

### **Program Highlights for the Third Quarter:**

- Major market events took place during September in all GI aimags. The events this year were a great success, attracting large crowds from across the aimags. The Prime Minister of Mongolia, Ts. Elbegdorj, the US Ambassador, USAID Mission Director and other senior officials from the US Embassy attended the official opening of the Dundgovi market fair on the 24th of September and visited the market stalls, talking to vendors and tasting the products. Also, Members of Parliament from Umnugovi, Govi-Altai, Govi-Sumber and Dundgovi aimags attended the fairs in their respective aimags.
  - The six events in 2005 generated total sales of 241.5 million MNT (215,600 USD); this was more than double the 2004 sales figures of 114.7 Million MNT (102,000 USD). Local products offered included dairy goods; bread, cookies and pastries; vegetables; wool and cashmere; hides and leather products; felt and felt products; wood/metal products; several types of handicrafts; wicker items; and construction materials. The dairy and vegetable products were in highest demand and all exhibitors of these products sold out within the first day of each event.
  - A total of 1,034 exhibitors participated in the six events. All of the GI cooperating clients participated, promoting and selling their goods and services to the general public, as well as other herder and non-herder businesses in the aimags. The banks all actively participated and promoted their services and loan products.
- The program has completed the assessment of the organizational development and future leadership needs of seventy eight (78) GI collaborating cooperatives, having met with over 230 members. The program is currently finalizing a detailed work plan aimed at building the institutional capacity of the cooperatives over the next six months. The areas identified for further technical assistance include; training on the legal environment and regulations governing the establishment of a cooperative (cooperative laws, tax regulations etc), cooperative management and financial management training, and marketing assistance.
- The evaluation of the project by a three-person team led by Jim Carlson from USAID/WDC was conducted over a three week period in August, including a six-day field visit to 3 aimags.
- GI-supported cooperatives in Dundgovi, Umnugovi and Uvurhangai have completed four deliveries of vegetables to Ivanhoe Mines, bringing the total delivered this season to 15 tons and 7.2 million MNT (6,400 USD) in sales. The vegetables included potatoes, onions, cabbage, turnip, tomatoes, cucumbers, peppers, watermelon and carrots. The evolving business relationship between the Gobi vegetable producers and Ivanhoe Mines was highlighted in a "UB Post" article in September.
- GI and Ivanhoe Mines have begun the process of establishing an independent commercial bus service to transport Ivanhoe employees between Dalanzadgad and the Oyu Tolgoi mine site. It is expected that this service will be owned and operated by an Umnugovi resident. Ivanhoe will contract a minimum number of seats for each trip for an extended period of time, and GI will provide business planning support, any required training/technical assistance, and a guarantee against a commercial loan for the purchase of a bus and for some working capital. A second route is also being planned for Ulaanbaatar-Oyu Tolgoi. This is the first of several services that Ivanhoe is seeking from local area residents.
- A team of three scientists from Texas A&M University joined the Gobi Forage team for three weeks to conduct further field work to verify the forage forecasting model and to continue development of the website that will be used to disseminate the forage forecasting information. The team also made

presentations on the current status of the forage forecasting work, and the science behind the project, to the USAID Mission, the Research Institute of Animal Husbandry and the Institute of Hydrology and Meteorology.

- Gary Hickman, an international "arid-lands" agricultural expert completed a six-week consultancy. Mr. Hickman worked with staff to validate the project's agricultural strategy and developed a policy and set of parameters/standards covering vegetable and fodder crop production in the Gobi and hangai regions in which GI works. Mr. Hickman also facilitated two training workshops for GI staff and consultants on topics such as soil fertility, irrigation systems, pest control methods, and planting/cultivation systems for arid/dry regions.
- The Gobi Initiative project appeared in the ILO's "BDS Reader", highlighting innovative BDS programs around the world. The brief one-page summary, entitled "Enabling Remote Rural Herders to Diversify their Business Activities", provides some statistics about the project and details concerning the current BDS "structure" and post-project sustainability plans. Business information dissemination methods, including "Market Watch" are also mentioned. The text is included as appendix 5; ILO The 2005 Reader, From BDS to Making markets work for the poor; Example 43: Enabling Remote Rural Herders to Diversify their Economic Activities Mercy Corps and PACT in Mongolia.
- Pact completed production of the new 26-part educational TV drama "Endless Labyrinth". The series follows the efforts of a rural family to develop and operate a small business and the challenges that they face in researching the local market, securing financing, producing a quality product, managing the business, and dealing with local corruption issues. The program has been heavily promoted in local newspapers and through banners and posters. The series debuted on Mongol TV in September.

### **INTERMEDIATE RESULT 1.3-1 Increase in Number of New and Strengthened Businesses**

#### **Activity One: Business Plan Development**

For the majority of the herder businesses, the quarter has been a busy period, with July and August dedicated to 'production' activities and September the time for 'harvest' and 'sales'. The program officers have concentrated efforts on providing technical assistance and support to the dairy, felt, vegetable and hay/fodder crop businesses during the summer. Overall the herder business implementation is going well; at least sixteen (16) businesses have already exceeded their planned production/sales targets for the year (6 dairy processing, 2 felt, 1 vegetable, 1 meat, 4 veterinary, 1 tourism and 1 gas station).

Four (4) herder clients that are successfully implementing their businesses this year are highlighted below.

#### **Ideenii Deed Cooperative**

The Ideenii Deed cooperative was formed in 1997 as a means for 14 families in Uvurhangai to raise their standard of living. The cooperative has over 1,735 animals including 650 yaks. The cooperative's main asset is a butter churn with a 150 Kg capacity.

In 2005, Ideenii Deed developed a business plan, with assistance from GI, for producing a longer-lasting butter. The cooperative used a 1,000,000 MNT loan facilitated by Mercy Corps plus 950,000 MNT of its own funds to buy 1,500,000 MNT worth of raw materials and 450,000 MNT worth of yeast from Hanson Laboratories, a Danish company. The yeast combines with milk to create a butter product with a longer shelf life. Mercy Corps provided training to teach the cooperative members how to use the special yeast.

The cooperative's income for 2005 has surpassed expectations by over 20%. Its planned sales for the year were 1,800,000 MNT. Total actual sales for the first three quarters of 2005 are 2,175,000 MNT. Ideenii Deed had planned to sell its butter to Delgereh Huns, a bread and pastry factory in Arvaiheer. The parties were unable to agree on a price so the cooperative decided not to sell to the factory. The cooperative recovered from this setback by selling through their own shop in Jargalant bagh and to the gold miners in Uyanga soum (5-10%), to the 'Naraantuul' market in Ulaanbaatar (30-40%), and to a regular trader in the Arvaiheer dairy market (60%).

Currently, Ideenii Deed sells its butter by the kilogram in plain waxed paper. The cooperative's future plans include packaging and selling the butter under its own brand.

#### **Gurvan Tsahir Cooperative**

The Gurvan Tsahir cooperative cultivates land located next to the Baidrag river in Buutsagaan soum in Bayanhongor aimag. This year the cooperative received technical training on; vegetable cultivation, processing and preserving vegetables, and the design, management and cultivation of vegetables in a greenhouse. Additionally, with assistance from GI, they have obtained the necessary legal documents from the government to use the land for a five year period. The group has made a number of improvements to the land, completely fencing the perimeter and repairing the irrigation channel. This year the cooperative received a loan of 1,300,000 MNT which they used to buy soil cultivation attachments (a plough, cultivator and fertilizer spreader) and parts (wheels, transmission belts) for their tractor. Also, spare manual equipment (shovels, rakes and hoes), fencing posts, hybrid vegetable seeds, fertilizer, manuals on planting and materials to construct a green house.

This year, a total of 3.6 hectares of land was cultivated by the cooperative, yielding 14,050 kg of 11 different vegetables and fruits. These include; potatoes (6,500 kg), tomatoes (800 kg), cucumbers (500 kg), watermelon (300 kg), cabbage (3,000 kg), carrots (700 kg), turnips (1,200 kg), onions (100 kg), garlic (500 kg), sea-buck thorn (150 kg) and currants (300 kg).

The group has already surpassed their planned sales of 4,216,000 MNT by more than 100,000 MNT. The greater part of their sales came in September from three sources - the GI-sponsored market days in Bayanhongor and Dundgobi (347,000 MNT), a gold mine camp close to Buutsagaan soum (545,500 MNT) and the Buutsagaan soum school dormitory (2,464,500 MNT) with whom the cooperative established a formal agreement this year. The rest was sold in the soum center to residents and herders (538,000 MNT).

#### **Erdene Uul Cooperative**

The 14-member "Erdene Uul" cooperative in Chandmana soum of Govi-Altai aimag developed and is currently implementing a business plan covering the production of ger felt and felt products. The cooperative received a loan of 4,000,000 MNT, and used the funds to purchase 10 tons of sheep wool and two wool opening machines, and to refurbish the building used for producing the felt.

The cooperative commenced production in July and over the past three months they have produced 330 large felt pieces used for gers, 10 horse saddle pads, 65 mattresses, 15 rugs and 40 pairs of felt boots. The cooperative has focused on selling to individual clients, with contracts signed in advance. Sales to date are 8,935,500 MNT and the cooperative has created 3 full-time and 5 part-time jobs with each full-time employee earning 960,000 MNT in wages.

#### **Deed Uglug Cooperative**

Building on previous support from GI, the Deed Uglug cooperative expanded their 2005 business plan to deliver veterinary services, focused on the treatment of neonatal disease, to over 216 herding families of Tseel soum in Gobi-Altai. The planned annual sales for 2005 were 7,332,000 MNT; the cooperative has already achieved sales of 8,286,930 MNT.

In the period from June through September, the cooperative members generated over 5,300,000 MNT from vaccinations, deworming, and ectoparasite dipping. Additional revenue will be generated in the upcoming quarter from disinfection of winter camps and meat analysis. The cooperative received a loan of 630,000 MNT which was used to procure an autoclave for sterilization of equipment, water distiller, and syringes. This new equipment was used to treat over 6,500 cases of neonatal enteric disease using 450 liters of prepared medicine solution during the spring lambing/calving months, producing over 750,000 MNT of income.

In June, the director sent one of the cooperative's veterinarians to participate in the RASP-funded veterinary continuing education seminar. This training opportunity and access to new drugs and equipment has resulted in increased revenue from an expanded offering of veterinary services, including treatment of infectious disease and effective parasite control. This has resulted in improving the financial success of the cooperative while providing a needed veterinary service for the herding community.

This year, a total of forty-two (42) herder clients have developed business plans for vegetable and fodder crop production. With the end of the summer growing season and the start of the harvest period, a preliminary

estimate of the total harvest is 62% of the planned harvest. Overall, the yields are satisfactory, with an increase over the first year due to the improved and timely technical assistance provided by the aimag-based consultants and GI program officers, as well as the fact that many of the herders have gained experience over the last two growing seasons. There is still potential to increase yields through reducing soil pH levels, better weed and pest control, and improved irrigation systems.

Table 1: Vegetable and fodder crop harvests to date in the six target aimags by GI herder clients.

<i>Vegetable Type</i>	<i>Total Harvest (kg)</i>	<i>Planned Production (kg)</i>	<i>Variance</i>
Potato	264,153	306,380	A number of clients have not harvested their potatoes from the field and will do so in early October. The later harvest is one way of storing the vegetables and waiting for the prices to increase in the market after the summer surplus is sold.
Cabbage	34,885	38,500	Some groups had lower than expected yields due to a shortage in irrigation and available water and in some cases animals got into the fields and ate the plants.
Turnip	47,372	44,480	Production targets have been met. This can be attributed to improved targeted technical assistance, better quality seeds and inputs and an increase in the skills and abilities of the clients cultivating the crops.
Carrot	21,093	19,750	Production targets have been met. This can be attributed to improved targeted technical assistance, better quality seeds and inputs and an increase in the skills and abilities of the clients cultivating the crops.
Onion	4,120	6,900	A number of clients have not harvested their onions from the field and will do so in early October. The later harvest is one way of storing the vegetables and waiting for the prices to increase in the market after the summer surplus is sold.
Other vegetables	18,373	32,950	Some groups had lower than expected yields due to a shortage in irrigation and available water, pests and in some cases animals got into the fields and ate the plants.
Animal fodder	96,470	62,920	Production targets have been met. This can be attributed to improved targeted technical assistance, better quality seeds and inputs and an increase in the skills and abilities of the clients cultivating the crops.
Natural Hay	451,000	771,560	The difference in planned production and total harvest to date is due to the drought conditions experienced across parts of the Gobi Aimags. One area hard hit was Gobi-Sumber Aimag where the program had three clients with hay production business plans. With the drought conditions, the grass growth was poor, resulting in lower yields per hectare than was originally planned. Additionally, drought conditions in other parts of the Gobi Aimags also affected hay production activities; Uvurhangai Aimag had one client, 'Ikh Salkhit', who did not produce any hay due to the poor rangeland grass conditions and very little grass available for hay production.
<b>Total</b>	<b>937,466</b>	<b>1,283,440</b>	

The program continues to use sales generated from new business activities outlined in the formal business plans developed under the project as an indicator of success. The sales target for the 162 herder groups and cooperatives who will receive assistance during 2005 is MNT 1,304,848,370. As of September 30th, 2005

total sales of MNT 749,966,128 had been generated by 152 groups, in accordance with the plan. The majority of herder client business plans are seasonal in nature (vegetable/fodder/dairy/felt/meat) with production and sales occurring during the fall and winter months. The sales figures for this quarter have more than doubled from the last reporting period, the majority of these sales being made at the annual Aimag market events.

Table 2: Sales from the 162 herder groups/ cooperatives during the third quarter

Aimag	Planned Sales Amount CY2005 from Business Plans (MNT)	Actual Total Sales Amount (MNT) (First quarter Jan - March)	Actual Total Sales Amount (MNT) (Second quarter April-June)	Actual Total Sales Amount (MNT) (Third quarter July-September)
Umnugovi	232,052,200	13,945,800	48,123,150	118,251,218
Dundgovi	238,861,800	3,301,000	38,907,000	86,918,120
Uvurhangai	359,406,070	38,543,350	63,570,210	122,933,750
Govi-Altai	220,843,100	3,007,700	21,352,990	60,396,140
Bayanhongor	133,350,200	347,600	11,455,400	46,577,700
Govi-Sumber	120,335,000	5,257,000	35,792,000	31,996,500
<b>TOTAL</b>	<b>1,304,848,370</b>	<b>64,402,450</b>	<b>219,200,750</b>	<b>467,073,428</b>

Sales revenue targets and actuals for individual herder clients, through September 30th, are included in Appendix 1.

### Business Planning for Non-herder Businesses

During the third quarter, the aimag-based business officers worked with 4 non-herder businesses to develop and complete their business plans. Table 3 provides details of the businesses that have completed their business plans and started with implementation of their plans during the third quarter. A total of twenty five (25) non-herder businesses have now completed business plans and have started to implement their plans with technical assistance from the program.

Table 3: Businesses that have completed their business plans during the third quarter

#	Aimag	Business Name	Activity	Legal Status
1	GA	Buural Yesun Hesul	Chicken production	Cooperative
2	GA	Buuren Chandmana	Hotel/restaurant	LLC
3	DG	Zambagiin Taal	Hotel/restaurant	LLC
4	UG	Galbyn Ulaan	Camel wool processing	Cooperative

Additionally, the aimag-based program officers completed selection of a further ten (10) new non-herder business clients and their business plans are currently being developed and reviewed by the UB-based program officers. Table 4 provides the details of these new non-herder businesses and their business ideas. There will be no further selection of non-herder clients this year; the program officers will now concentrate efforts on providing the existing businesses with targeted assistance, and monitoring and evaluating the businesses as they implement their current plans.

Table 4: Businesses that are currently developing their business plans with assistance from the program

#	Aimag	Business Name	Activity	Legal Status
1	UH	Suundalai	Worm curd production	Cooperative
2	GS	Bars Moriton	Bread and fine pastry production	LLC
3	GS	Govin Tuya	Tailor	Partnership
4	DG	Itgel Zutgel Hugjil	Tailor	Cooperative
5	BH	Sulden Tenger	Sausage/Intestine processing production	Cooperative
6	BH	Ih Uul	Ham meat production	Partnership
7	BH	Nomin Huh	Bread and fine pastry production	Cooperative
8	BH	Borgiot	Dairy processing - production of butter	Cooperative
9	BH	Munhiin Huch	Carpentry	Cooperative
10	BH	Hugjliin Deej	Animal Mineral Salt production	Cooperative

### Activity Two: Cooperative Formation and Development

Of the original 160 groups that developed business plans during 2005, 90 were existing legally registered business entities (cooperatives, limited liability companies and partnerships) and the remaining 72 were herder groups. During this reporting period, a total of four herder groups became formal cooperatives/partnerships, completing their registration with the government authorities (1 group in BH, 1 group in GA, 1 group in GS, and 1 group in DG) This was accomplished through assistance provided by GI aimag staff and five organized training events covering essential cooperative-related topics such as: cooperative management, structure and leadership, operations and marketing, record keeping and reporting, and taxation and regulatory compliance.

Table 5: Total Numbers of Herder Groups and Cooperatives/ Registered Businesses

	BH	DG	GA	GS	UG	UH	Sept. 2005
Total	31	28	29	11	29	34	162
Number of Co-ops / Registered Businesses	31	22	9	18	17	29	132
Number of Herder Groups	-	6	6	2	11	5	30

Since the beginning of Gobi Phase II in January 2004, Mercy Corps has assisted 66 herder groups to become formal legal entities.

During the reporting period a three-day workshop was held in Bayanhongor aimag for all aimag-based program officers, with the objective to increase the basic understanding about cooperative development, the government's policies and regulations governing registered cooperatives and cooperative tax laws. The training was crucial for the aimag staff as they are the main contact people dealing with rural herder cooperatives. The workshop provided an opportunity for the program staff to discuss problems that they regularly encounter while working with the cooperatives.

The program has completed the assessment of the organizational development and future leadership needs of seventy eight (78) GI collaborating cooperatives and has met with over 230 members. The program is currently finalizing a detailed work plan aimed at building the institutional capacity of the cooperatives over the next six months. The areas identified for further technical assistance include; training on the legal environment and regulations governing the establishment of a cooperative (cooperative laws, tax regulations etc), cooperative management and financial management training, and marketing assistance. During the cooperative assessment work, the cooperative members were encouraged to select at least one young member from the cooperative that could potentially be the future leader. Seventy three (73) cooperatives identified potential young leaders, including 62 men and 11 women. A training curriculum and materials are being developed based on the needs expressed by the young leaders themselves. The topics that will be covered in the training will include: how to establish a cooperative (registration and legal compliance); cooperative management skills, leadership skills, financial management and record keeping and how to market your produce.

### Activity Three: Agriculture Training and Technical Assistance

During the third quarter, a total of fifty-two (52) training and technical assistance (TA) interventions were organized and implemented, with the strongest focus on: vegetable and fodder crop cultivation, weed control and irrigation systems and preparation for harvesting; dairy milk processing technology; and felt making technology for herder cooperatives. Table 6 provides a summary of all training and TA provided to the GI herder clients during the quarter. As in Year One, the majority of these trainings and TA interventions were planned and implemented by the local aimag consultants and the aimag-based program officers.

Table 6: Summary of Training and Technical Assistance Provided in the third quarter 2005

#	General classification of TA	Interventions Provided July - Sept 05	Provided by UB consultant	Provided by Aimag consultant	Provided by GI Program Officer
1	Financial management - accounting, record keeping and banking	3		3	
2	Dairy milk processing - types of milk products, processing technology - the use of modern cultures, use and maintenance of equipment	14	4	9	1
3	Vegetable/crop production - soil preparation, seed certification, planting methods, diseases and pests, harvesting, storage and processing	15	2	13	
4	Felt making technology	9	2	7	
5	Fodder/forage production - soil preparation, selection of suitable crops, diseases and pests, harvesting, processing, storage (hay/silage)	2		2	
6	Cooperative development - management, structure, leadership, operations, marketing, record keeping and reporting, and regulatory compliance	5		3	2
7	Bakery/food processing - equipment identification, sourcing and maintenance, new product development	2	2		
8	Livestock production - livestock intensification under Gobi conditions, design of livestock barns, feeding supplements, grazing rotations for fenced pasture.	2	2		
	<b>Total</b>	<b>52</b>	<b>12</b>	<b>37</b>	<b>3</b>

The UB-based agriculture officer, in cooperation with the aimag officers, collected a total of twenty nine (29) soil samples from the fields of the herder clients (UG, BH, DG and GS) that are engaged in vegetable and fodder crop production. The soil samples were then analyzed at the Institute of Geography, Mongolian Academy of Science. The results were returned to the respective herders with copies also provided to the local aimag-based vegetable consultants. The consultants will work with the herders after the harvest this year to help them improve their soil fertility in preparation for next year's cultivation.

During the quarter there were no requests for 'refresher courses'. As described in the Annual Work Plan, these courses are offered by the program if there is a strong client demand for the training, and provided that the participants are willing to cover the full costs of the course.

#### Activity Four: Acquiring Critical Inputs

The GI Program Officers continue to provide the herder clients with assistance and advice to identify and purchase the equipment that is appropriate for their businesses. During the quarter twelve (12) herder clients purchased machinery as part of their business diversification plans. The machinery includes soil cultivation equipment, small tractors, irrigation pumps, wool opening machines, veterinary medicines and equipment, dairy milk processing equipment (including milk separators and yoghurt packaging equipment), and construction materials for animal shelters. Most of these equipment purchases were financed through loans obtained by the respective herder businesses.

During the last quarter of the year the Program Officers in Umnugovi, Gobi-Altai, Bayanhongor and Uvurhangai will hold discussions with local government officials to draft travel plans and budgets for herder



clients and government officials to go on exchange visits to Inner Mongolia during the spring of 2006. The expenses for the trips will be shared between GI, the government and the herders.

The participants will travel to Huh-Hot city, Inner Mongolia, China. The objectives of the trips will be to visit a number of existing small scale herder businesses in the region, to learn how they manage their pastures, design winter shelters, plant trees and wind breaks, produce animal-related products and access markets. The herders will also visit private veterinarian practices and participate in an agricultural equipment fair to purchase equipment needed for their own business plan implementation. Two specific businesses that the groups will visit are: a small dairy cattle farm and a processing factory run and managed by three families; and a business that produces and packages dried beef jerky in three different sized packages. The dairy processing factory produces fourteen different dairy products, and pasteurizes, packs, and sells the products through their own shop and by contract with customers. The business producing dried beef jerky includes in each package instructions on how to use the dried meat.

As part of the program's technical assistance, the aimag-based program officers have provided loan facilitation assistance to those herder groups/cooperatives with approved business plans. In this third quarter, a total of 16 herder businesses and 4 non-herder business received loans totaling MNT 80,700,000 (USD 125,200), bringing the year-to-date total of loan recipients to 141 businesses and MNT 394,189,000 (USD 351,950). Mercy Corps provided a total of MNT 53,260,000 (USD 47,550) as additional cash collateral during the quarter through the USDA-funded loan guarantee program component; the year-to-date total is MNT 290,323,100 (USD 259,200).

Since the beginning of Gobi II, Mercy Corps has assisted 191 businesses to obtain commercial financing of MNT 518,289,000, of which MNT 393,213,100 (USD 351,080) has been guaranteed through the USDA-funded 'Rural Agribusiness Support Program'.

#### **Aimag State Veterinary Laboratories**

During the reporting period, there has been close collaboration between GI and the State Central Veterinary Laboratory (SCVL) with respect to the equipping of four aimag vet labs and the training of lab staff. All equipment has been ordered and is expected to arrive in Mongolia no later than November, 2005. Once the equipment is in country it will be transported to the labs and installed using trained personnel from the SCVL. An on-site visit to the labs for follow-up training on use of the equipment will take place in the fourth quarter. An official dedication of the laboratories will be scheduled upon completion of all components of the project, and prior to the end of the fourth quarter.

The training curriculum for the laboratory personnel has been reviewed and approved. The training will focus on use of the new equipment and on updating staff knowledge of disease surveillance and monitoring. Three participants from each of the four veterinary laboratories have been invited to attend the Ulaanbaatar training which will take place over a three-week period in October, 2005. A consultant currently residing in Ulaanbaatar has been identified and contracted to carry out the epidemiological portion of the training. A contract has been signed between GI and the SCVL outlining detailed roles and responsibilities with respect to the project. The initial payment has been made to the SCVL with final payment dependent upon completion of all tasks before the end of the fourth quarter.

#### **Activity Five: Long-Term Technical Assistance**

GI has been working to identify long-term assistance needs for the twenty one (21) non-herder clients who finalized their business plans during the third quarter. Of these 21 businesses, fifteen (15) have received loans for investment in equipment and working capital, totaling 92 million MNT (82,000 USD). The sales target for the 21 non-herder clients who will receive assistance during 2005/2006 is MNT 705,795,468 (630,000 USD). As of September 30<sup>th</sup>, 2005, total sales of MNT 309,296,750 (276,000 USD) had been generated by the 21 businesses, in accordance with the plans. Table 7 provides detailed sales revenue targets and actuals through September 30.

Table 7: Details of Non-Herder Clients Sales during the First Nine Months of 2005

	Aimag	Clients	Planned Sales CY2005/2006	Total Sales to Date
1	GS	Ergel Bogdyn Zoo	75,585,380	15,987,150
2	GS	Lucky Dent	32,344,500	7,235,000
3	GS	Ulzii Hugjil	25,380,000	1,045,000
4	GS	Emeeliin Hishig Hond	3,446,363	1,161,000
		<b>GS Total</b>	<b>136,756,243</b>	<b>25,428,150</b>
5	UH	Suun Dalai	27,000,000	14,280,000
6	UH	Itgel	104,633,500	62,480,900
7	UH	Tsars Hangai	28,487,700	32,524,900
8	UH	Tu-Ba-Se	22,890,000	21,945,000
		<b>UH Total</b>	<b>183,011,200</b>	<b>131,230,800</b>
9	BH	Naran Uul	95,280,000	44,120,600
10	BH	Zun Bid cooperative	11,070,000	246,000
11	BH	Garyn Buyan Baidrag	37,440,000	18,911,000
12	BH	Nasan Hishig	7,372,800	4,557,800
13	BH	Gurvan Eht cooperative	15,681,600	9,707,300
		<b>BH Total</b>	<b>166,844,400</b>	<b>77,542,700</b>
14	DG	TEBBE LLC	52,593,000	20,950,000
15	DG	Uugandalai	22,757,000	14,780,000
16	DG	Ulzii-Dundgovi	15,750,000	16,022,100
		<b>DG Total</b>	<b>91,100,000</b>	<b>51,752,100</b>
17	GA	Arvin Dult	27,250,000	800,000
18	GA	Dashmyangan	29,435,000	7,871,000
		<b>GA Total</b>	<b>56,685,000</b>	<b>8,671,000</b>
19	UG	Gal Munkh	66,782,625	13,000,000
20	UG	Galbyn Ulaan	3,240,000	1,079,000
21	UG	Mandal Goyol	1,376,000	593,000
		<b>UG Total</b>	<b>71,398,625</b>	<b>14,672,000</b>
		<b>GRAND TOTAL</b>	<b>705,795,468</b>	<b>309,296,750</b>

In addition to support for business plan development, GI has provided the selected businesses with targeted training and technical assistance, as follows:

Table 8: Long-Term technical assistance provided to Non-Herder Businesses during the second quarter

No	Aimag	Business name	Technical Assistance topic(s)	Consultant	MNT and % consultant fee cost share
1	GS	1) Emeeliin Khishig Hond partnership	Agro-technology: vegetable cultivation including; irrigation systems; weed control measures; harvesting techniques and vegetable storage advice	S.Bilgmaa (UB)	This is a series of trainings and the client paid the cost share at the start
2	DG	1) Uugandalai LLC	Advertising and Public Relations	D.Sukhbaatar (UB)	This is a series of trainings and the client paid the cost share at the start
3	BH	1) Gurvan Ekht coop 2) Gariin Buyan Baidrag LLC	Installation/use of modern bakery equipment.	J.Urantsetseg (UB)	60,000 / 50%
4	DG	1) Uugandalai LLC	Food Service Technology	B.Gankhuyag (UB)	23,000 / 30%
5	BH	1) Arvin Dult LLC	Marketing and Advertising	Bilegsaikhan (UB)	30,000 / 20%
6	BH	1) Naran Uul coop	Pig production and husbandry (breeding, feeding, rearing of	B.Enkbayar (UB)	30,000 / 20%

			piglets) and the design and construction of appropriate pig shelters/barns		
7	DG	1) Uugandalai LLC	Dairy milk product processing, yoghurt production, dairy product health and safety technology	Ts.Batsukh (UB)	23,000 / 15%
8	UH	1) Suundalai LLC	Dairy processing technology and the processing and storage of 'worm' curds.	Ts.Chimgee (UB)	30,000 / 39%
9	BH	1) Gariin Buyan Baidraga LLC	Business management	L.Tserenchimed (UB)	30,000 / 37.5%
10	BH	1) Gurvan-Ekht cooperative 2) Zunbid cooperative	Marketing and Advertising	Yu.Otgonjargal (UB)	50,000 / 32.5%

### Activity Six: Short-Term Technical Assistance

During the quarter, only two requests were received from non-herder businesses for specific short-term technical assistance. Both businesses receiving the TA contributed towards the cost of the activity.

Table 9: Short-Term technical assistance provided to Non-Herder Businesses

No	Aimag	Client name(s)	Technical Assistance topic(s)	Consultant	MNT and % consultant fee cost share
1	GA	Byart Olon LLC	Marketing consultancy	Bilegsaikhan (UB)	80,000 / 69%
2	UH	Houjirt tour LLC	Food Service Technology	B. Gankhuyag (UB)	30,000 / 39%

### Activity Seven: Local Capacity Building for Training and Technical Assistance

The program continues to concentrate efforts on improving and developing the skills and technical knowledge of the aimag-based consultants and program staff who provide training and technical assistance to program clients. During the quarter, Gary Hickman, an international "arid-lands" agricultural expert completed a six-week consultancy. Mr. Hickman worked with staff to validate the project's agricultural strategy and developed a policy and set of parameters/standards covering vegetable and fodder crop production in the Gobi and hangai regions in which GI works. Mr. Hickman also facilitated two training workshops for seven GI staff and fourteen aimag-based consultants on topics such as soil fertility, irrigation systems, pest control methods, and planting/cultivation systems for arid/dry regions.

The consultant traveled to Bayanhongor, Uvurhangai, Dundgovi and Umnugovi and visited twenty herder clients who are cultivating vegetable and fodder crops. As noted in the consultant's report:

Based upon a field survey of twenty GI-supported vegetable sites currently under cultivation in the four aimags, it is possible to conclude that vegetable production in the Gobi and hangai regions of Mongolia is economically viable under certain conditions. These conditions include an adequate water supply and at least average soil conditions. There are, however, a number of specific technical issues that, if successfully addressed, could also greatly improve both the quantity and quality of vegetable production. Of primary importance is that the growing of vegetables should be concentrated in smaller land areas, thus reducing labor requirements, the quantity of inputs needed for soil improvement, and problems related to weed and pest control, while at the same time improving water use efficiency. Of equal importance is that the GI project should continue the work of building the technical knowledge and skills of the local aimag-based consultants.

The field surveys and discussions with project staff, clients, and local consumers, helped to confirm that the GI model for assisting herder families in increasing income through agricultural diversification is conceptually-sound. In addition to assisting the herders directly, vegetable production is also aiding

consumers through increasing the availability of higher-quality local produce. The current production limitations noted in the report can all be resolved with relative ease. A good example concerns seed: a one-time importation of high quality, locally-adaptable, open-pollinated vegetable seed can significantly improve yields to profitable levels.

At most of the sites visited, adequate irrigation water was available in both quantity and quality. In situations of more limited water resources, simple drip irrigation systems were recommended. Drip tape, emitters, fittings and filters are already available in country, and are in fact already in use in certain regions. Continuing soil improvement programs will be critical for the longer-term sustainability of vegetable production efforts. Organic matter, nitrogen and other fertilizer levels can also be increased to improve yields and profit. The soil pH levels in most locations need to be decreased and effective weed management instigated in all areas. To accomplish these improvements, the consultant felt that continuing vegetable production training is essential for both clients and training and technical assistance providers. Local consultants need to receive additional technical, and scientifically-based, training. The training should start with basic plant biology and progress to advanced vegetable culture science. Additional printed materials should also be developed for farmers and regular training provided at demonstration centers.

The consultant's report is attached as Appendix 4 and outlines the conditions under which vegetable cultivation should take place. It also contains specific findings and recommendations related to vegetable cultivation in the Gobi and hangai regions. A "Vegetable Production Manual" is included with the report; the Manual has been translated into Mongolian and provides greater detail and specific technical information. The GI Program Officers are currently developing a set of comprehensive vegetable cultivation training manuals using information and recommendations contained in the consultant's report. The training manuals will be printed and distributed to the GI aimag offices and aimag-based consultants for use in future technical assistance interventions with herder clients.

During the quarter, no aimag-based consultants were involved in the local consultant 'certification' process. This was due to the fact that the aimag-based consultants most frequently hired (vegetable and fodder crop, dairy processing and cooperative development) have already been certified. With the remaining 'technical specific' aimag-based consultants less frequently hired, the program has focused on other priorities. It has also been a challenge to find suitable Ulaanbaatar-based consultants that are available to conduct the on-site assessment of these remaining consultants. To date this year, a total of twenty-eight (28) aimag-based consultants have been certified by the program. The consultants that received an 'excellent', 'good' or 'very good' rating will continue to be regularly hired to provide training and technical assistance to program clients. The consultants that received an 'OK' rating will receive additional training through the GI program to improve their skills and knowledge, after which they will be re-evaluated. These training activities will be planned and implemented during the final quarter of the year. The 'certifying' process will continue to be implemented in the aimags until all local aimag-based technical providers have been assessed.

### **Activity Eight: Market Development**

During the quarter, all six aimags successfully organized annual market events/trade fairs in close cooperation with the local governments. The financial costs of the events were covered by GI, local governments, and the private sector (businesses, banks etc). Table 11 provides the financial summary of the six events. The Prime Minister of Mongolia Mr. Ts. Elbegdorj, the US Ambassador and the USAID Mission Director officially opened the trade fair in Dundgovi Aimag and visited all the exhibitors at the fair. Also, Members of Parliament from Umnugovi, Govi-Altai, Gobi-Sumber and Dundgovi attended the fairs in their respective aimags. The fairs attracted huge crowds and the six events generated total sales of 241.5 million MNT (215,600 USD), more than double the 2004 sales figure of 114.7 million MNT (102,000USD). Table 10 provides the breakdown of sales for the six events. Local products offered included dairy goods; bread, cookies and pastries; vegetables; wool and cashmere; hides and leather products; felt and felt products; wood/metal products; several types of handicrafts; wicker items; and construction material. The dairy and vegetable products were in highest demand and all exhibitors of these products sold out within the first hours of the events. A total 1,034 exhibitors participated at the six events. All GI clients participated, promoting and selling their goods and services to the general public, as well as other herder and non-herder businesses in the aimags. The banks were also all represented at the events.

A separate summary of the market events/trade fairs is attached as Appendix 2. A series of pictures from the events is attached as Appendix 3.

Table 10: Sales Breakdown (MNT) for all six events

	GS	BH	UH	DG	GA	UG	TOTAL
Dairy products	4,375,850	5,453,700	1,746,300	6,468,060	8,338,970	5,900,000	<b>32,282,880</b>
Vegetables and fruit	848,000	7,214,500	1,354,325	3,159,830	4,754,200	3,100,000	<b>20,430,855</b>
Electric appliances	0	0	19,645,000	15,500,000		8,000,000	<b>43,145,000</b>
Wool/cashmere products	0	300,000	6,566,300	1,650,260		1,000,000	<b>9,516,560</b>
Bread and baked goods	478,250	2,452,000	9,460,000	4,387,000	855,800	3,900,000	<b>21,533,050</b>
Hides and skins		842,000	9,460,000	268,000		1,950,000	<b>12,520,000</b>
Felt products	421,200	540,000	282,500	1,237,695	250,800	1,000,000	<b>3,732,195</b>
Construction materials		1,739,400	5,755,000	1,900,000	470,000	2,100,000	<b>11,964,400</b>
Wooden products	2,465,000	954,000	1,378,500	800,500	2,641,500	1,100,000	<b>9,339,500</b>
Animals		0	9,460,000	0	900,000	2,300,000	<b>12,660,000</b>
Handicrafts	3,567,000	545,000	412,000	172,000		1,100,000	<b>5,796,000</b>
Gold and silver products		0	1,622,000	340,000		700,000	<b>2,662,000</b>
Metal products		750,000	687,000	128,000		1,000,000	<b>2,565,000</b>
Stitched/woven products		276,000	43,500	825,130		1,300,000	<b>2,444,630</b>
Printed products		260,000	0	412,565		300,000	<b>972,565</b>
Meat products		2,202,000	0	486,400	1,022,000	300,000	<b>4,010,400</b>
Boots		570,000	391,000	389,000	685,100	850,000	<b>2,885,100</b>
Fuel blocks		0	0	170,000		350,000	<b>520,000</b>
Services	7,882,600	1,354,000	14,478,180	0	6,100,900	1,900,000	<b>31,715,680</b>
Others			9,645,950	75,500		1,050,000	<b>10,771,450</b>
<b>Total</b>	<b>20,037,900</b>	<b>25,452,600</b>	<b>92,387,555</b>	<b>38,369,940</b>	<b>26,019,270</b>	<b>39,200,000</b>	<b>241,467,265</b>
%	8.3%	10.5%	38.3%	15.9%	10.8%	16.2%	<b>100.0%</b>

The total cost to GI for the six market events in 2005 was 7,737,855 MNT (6,900 USD) which was 28% of the total cost of the events of 27,669,825 MNT (24,700 USD).

Table 11: Financial Summary (MNT) for all six events

		Aimag						
		GS	GA	UG	DG	UH	BH	Amount
<b>Revenue</b>								
1	Gobi Initiative	755,600	1,438,400	539,500	1,990,855	1,381,500	1,632,000	7,737,855
2	Local Government	559,000	1,500,000	800,000	400,000	918,500	2,550,000	6,727,500
3	Corporate & Institutional Sponsors	500,000	420,000	4,535,000	1,450,000	242,800	355,000	7,502,800
4	Exhibitor fees	76,000	800,000	265,000	214,000	1,150,000	350,000	2,855,000
5	Raffle tickets	390,600	2,850,000	125,000		1,111,700	185,000	4,662,300
6	Training fee		7,000	0				7,000
<b>Total Revenue</b>		<b>2,281,200</b>	<b>7,015,400</b>	<b>6,264,500</b>	<b>4,054,855</b>	<b>4,804,500</b>	<b>5,072,000</b>	<b>29,492,455</b>

<b>Expenses</b>		GS	GA	UG	DG	UH	BH	Amount
1	Operational expenses	682,800	231,450	2,300,000	392,505	2,688,600	2,528,000	8,823,355
2	Advertising &	373,770	1,438,400	892,000	837,540	256,500	392,000	4,190,210

	promotion							
3	Facilities	279,500	1,306,000	300,000	718,980	46,000	1,032,000	3,682,480
4	Invitations & certificates	69,800	1,244,500	420,000	220,820	111,000	120,000	2,186,120
5	Services	30,000	370,000	1,432,500	851,260	287,600	300,000	3,271,360
6	Raffle prizes	430,800	1,500,000	920,000	1,033,750	1,131,750	500,000	5,516,300
<b>Total Expenses</b>		<b>1,866,670</b>	<b>6,090,350</b>	<b>6,264,500</b>	<b>4,054,855</b>	<b>4,521,450</b>	<b>4,872,000</b>	<b>27,669,825</b>
<b>Balance</b>		<b>414,530</b>	<b>925,050</b>	<b>0</b>	<b>0</b>	<b>283,050</b>	<b>200,000</b>	<b>1,822,630</b>

In Govi-Altai and Bayanhongor, a business plan that provides a coordinated framework for the development of an improved 'milk market' was finalized. These plans cover both the dairy market facility and a milk testing component. The development of the plans involved substantial consultation with all stakeholders, including the soum government, the local professional inspection agency, the local department of food and agriculture, the two private enterprises, and the GI office. The first sales through the new facility have begun. One lesson learned from the Govi-Altai experience was that the person or enterprise selected to do the product testing work must be qualified and certified and have the support of the community-at-large.

These plans present an innovative approach to improving the efficiency of the marketing system that provides the essential linkage between the herders producing the milk and the consumers that are the end users, as well as improving the hygiene and safety of the final consumer products. Slightly different approaches have been taken with respect to the Govi-Altai and Bayanhongor markets in terms of organizational structure (ownership and incentives), value-added services incorporated, division of milk testing responsibilities, and the structure for certifying the products and auditing the certification process. Given the number of stakeholders involved in fully moving these efforts toward completion, it is anticipated that considerable time and effort will yet be required. Careful monitoring is also essential in ensuring that remedial adjustments are made in the event that problems emerge, and also that learning from observation of the effectiveness of the slightly different approaches will be maximized so that the right model(s) can be scaled-up in later stages of the program in other appropriate aimags.

The market relationship with Ivanhoe and the sale of vegetables on a monthly basis has continued successfully this quarter with GI-supported cooperatives in Dundgovi, Uvurhangai and Umnugovi. A total of fifteen tons of vegetables have been delivered to date by seven cooperating GI clients. The vegetables included potatoes, onions, cabbage, turnip, tomatoes, cucumbers, peppers, watermelon and carrots. The evolving business relationship between the Gobi vegetable producers and Ivanhoe Mines was highlighted recently in a "UB Post" article. Also during the quarter, GI and Ivanhoe Mines have begun the process of supporting the establishment of an independent commercial bus service to transport Ivanhoe employees between Dalanzadgad and the Oyu Tolgoi mine site. It is expected that this service will be owned and operated by an Umnugovi resident. Ivanhoe will contract a minimum number of seats for each trip for an extended period of time, and GI will provide business planning support, any required training/technical assistance, and a guarantee against a commercial loan for the purchase of a bus and for some working capital. A second route is also being planned for Ulaanbaatar-Oyu Tolgoi. This is the first of several services that Ivanhoe is seeking from local area residents.

The aimag-based business officers, with support from the UB-based business officer, have developed and implemented comprehensive market research on potential market opportunities in the bakery, meat, dairy and vegetable markets within each aimag. The aimag-based business officers are currently analyzing the data and findings, and preparing the final reports. The market research information will provide useful information for the herder clients who will develop business plans for CY2006.

#### **Activity Nine: Local Capacity for Advocacy**

During this reporting period, no significant activities were implemented towards building local capacity for advocacy.

### **Activity Ten: Local Government Support for Business**

The September 2005 market events provided local government officials with an opportunity to participate in the planning and implementation of these events. This is the second year that the program has organized the trade fairs, and this year it was felt that many of the aimag stakeholders, including local government, the private sector and the NGOs, were more committed to and engaged in the active organization of the fairs. It is hoped that in the future, the fairs will become annual events with the local government and other stakeholders taking the lead in the planning and organization. With the Prime Minister of Mongolia and a number of members of Parliament attending the fairs, the program has received national recognition for its activities and, as a result, is generating greater interest on the part of the national government for support of rural business development efforts.

In Govi-Altai, the local government organized, in cooperation with GI, a training workshop for cooperative accountants. The training costs were covered by the aimag government and the workshop was facilitated by experienced trainers from the 'Cooperative Training Center'. The training was focused on helping the accountants to improve their financial record keeping and complete their tax return forms. Representatives from GI-supported herder cooperatives and the GI program officers attended the workshop.

In Bulgan soum, Umnugovi, a training session was held on current Government of Mongolia land laws and the government policy on land ownership. A total of twenty four (24) people participated in the training, including soum government officials, local businesses, and Gobi Initiative clients. During the course of the training it was evident that the soum government officials do not have sufficient technical knowledge regarding land laws and the government policy on land ownership. The lack of technical capacity of soum level officials in Bulgan soum has resulted in a number of land ownership disputes among the local community. The training provided a wealth of information and knowledge to the soum and bagh governors on the existing laws and policy, and advice on how to mediate land ownership disputes among herders. Much of the herder business diversification that is currently occurring across the Gobi region requires that herders are able to obtain legal land ownership or land use rights. With the success of this initial training in Bulgan soum, the program plans to replicate it in other GI aimags during the last quarter; initially the training will be held in those soums where GI herder clients are engaged in vegetable and fodder crop cultivation.

## **INTERMEDIATE RESULT 1.3-2 Increase in Availability, Access to and Use of Information**

### **Activity One: Business Information**

#### **CRSP Forage Forecasting.**

A three person team from Texas A&M University made its third visit to date to Mongolia to work on this component of the GI project. The three main tasks were to (a) undertake further field monitoring trips to gather data in Gobi-Altai and Uvurhangai, (b) verify soil characteristics of monitoring sites with a national soil expert, and (c) meet with scientists from the Institute of Meteorology and Hydrology and the Research Institute of Animal Husbandry (RIAH) to discuss the sharing of data and opportunities for graduate students to work with the project. During the forage sampling trip, Mr. Angerer and the team met with herders, representatives of the soums and baghs, and GI Program Officers to discuss optimal ways to disseminate the forage forecasting information to herders and other stakeholders. The field work has been intensive over the summer months, with the team completing eleven field trips to establish and or verify monitoring sites. The project has now established monitoring sites in all six Gobi aimags and the data has been loaded into the PHYGROW computer model databases. A total of two hundred and ninety (290) sites have now been established and the Texas A&M team are currently validating the computer model systems. Also, over sixty (60) soil samples have been collected by the team for further analysis; this specific soil data will be used for further validations of the PHYGROW computer model.

The next steps for the project include (a) continued verification of the forage forecasting model and the mapping products, (b) fine tuning of the computer model with adjustments based on the verification data, (c) efforts to improve livestock stocking rate information, (d) assessments of the accuracy of the satellite rainfall data, and (e) development of the outreach materials for dissemination of maps and other outputs. One of the problems encountered has been validating the rainfall recorded by the NOAA satellite system. In order to validate the satellite rainfall data, the project is cooperating with the Institute of Meteorology and Hydrology to

receive the Mongolia-specific rainfall data. GI is also installing rain gauges and thermometers with herder clients who will collect the actual weather and precipitation data that can then be cross referenced with the satellite weather data. During the quarter, the project officers started to translate the English-language forage forecasting web site into Mongolian. Once the computer modeling system has been validated by reconciling it to the actual 'on-the-ground' forage situation in the field, the web-site will be officially launched for public access in both languages.

A video technician from the US spent three weeks in country filming and preparing a fifteen minute video on the Gobi Forage project. The video will be used as a training tool for the Gobi Forage project officers as they begin to develop and disseminate the Gobi Forage products. The video will explain the forage forecasting technology and the products that will be produced for dissemination to the herders and stakeholders in the aimags. The video will expand on the methods and technology that potentially will be used for the dissemination of the forage forecast information; this will include a short section on the concept of 'member based organizations' such as herder associations and how an association could provide a variety of services such as forage forecasting information, supplemental winter feedstuffs, assistance with marketing products, veterinary care, machinery, and other miscellaneous services. The video is due to be completed by the middle of December in both English and Mongolian languages.

### **Production and Dissemination of RBN Mongolian Magazine**

In the third quarter, an average of 6,800 rural business operators (herding and non-herding) as well as government and non-government employees received business information through the 22- page monthly publication Rural Business News.

As usual, RBN ensured that the content remains educational, practical and relevant, with stimulating local success stories, knowledge-adding business and herding tips, experience-sharing best practices and other thought-provoking stories. The established corners - "Lead Story", "Business Corner", "Herders' Tip", "Aimag Stories", "Trip Diary", "Business ABCs", "Interview", "Legal Corner" and "Q&A" - provided the above content combined with journalistic styles and deep research on the topic. Topics that were covered during the reporting period included arranging organized markets for local producers, vegetable irrigation and fertilizing, establishing handcrafting businesses, pest control, financial management, felt-making, business correspondence, cashmere selling and storing, deriving income from local tourism, dairy food safety, pasture management, customer service, market research, marketing tips and tools, operating goat and yak fiber related businesses, business planning, hay and fodder making, cash management, meat processing, post-harvesting tips, vegetable preserving, and livestock breeding. The 'Herders' Tip' from RBN edition #43 - FAQs about rangeland management in summer is attached as Appendix 6.

RBN receives feedback through a number of different sources including its aimag-based Market Watchers, Gobi Initiative Representative Offices, stringers and direct correspondence. Many readers use the stories, and further requests for information are frequently sent to the RBN editor, including D.Lhagvasuren of Dundgovi aimag who has begun producing bricks with locally available materials, using information provided through RBN.

Lead topics provided a good overall review of the rural business environment, as verified by feedback from a herder, saying "Your newspaper provides business ideas and tips that are very useful to herders, including issues related to intensifying current nomadic herding practices. We read and exchange opinions on these stories. I remember one story on developing semi-settled and intensive animal husbandry and thought that it was perfectly directed at us." Aimag stories continued to present best practices and success stories of rural businesses, as well as ways to enhance small business operations and generate new business ideas. In total, 18 stories highlighting successful rural businesses appeared in RBN in the third quarter. Business operators were able to deepen their knowledge with tips on the marketing of souvenirs, tourist camp management, business correspondence, identifying potential markets, the '4Ps', business environmental studies, and small business marketing and advertising. One businessman, Mr. Dashaa of Bayanhongor said that he started using the tips to advertise a family-based business.

A successful farmer from Gobi-Sumber, Ms. L. Tsetsegmaa, learned about ways to mitigate beetroot pests. She asked for follow-up information on preserving vegetables, saying that the harvest was good due to good management and she has a need to preserve her excess production. According to the GI Representative



office, another herder from Gobi-Alta's Yusunbulag soum, J. Bolormaa, has begun successful cultivation of vegetables and the prevention of vegetable pests and diseases. "I got plenty of knowledge about the proper storage of cashmere and the proper use of summer pasture," said another herder, Mr. Y. Batbayar of Umnugovi. He added that he would get more income from cashmere sales after storing the cashmere according to tips supplied by RBN.

Pact/RBN is currently looking at a new monitoring and evaluation system that will help to further improve quality assurance.

The 'Technical Insert' pages, which focus on a specific topic every month, provided information on pest control, business planning (for new GI clients to be selected for the next year) and maintenance and repair of alternative energy sources (solar, wind panels and generators).

Cooperation with rural media continued, as evidenced by the appearance of RBN stories in local newspapers - 'Uvurhangai Life' and 'Bayanhongor News'. RBN successfully negotiated with local papers in Dundgovi (Gobi Life) and Umnugovi (Mongol Gobi) and agreed that they would publish at least three RBN stories each for the next quarter.

RBN also conducted an extensive public awareness and advertising campaign for two of the important products of Gobi Initiative, local trade fairs and a TV educational soap opera. Attached as Appendix 7 is a sample of the advertisement prepared for the 26 part TV drama. Subscription promotions took place, especially during the Trade Fairs in the six Gobi aimags, resulting in a total readership of 7,000 for October 2005. Local herder NGOs, GI Aimag Offices and Market Watchers carried out local promotion along with cross-promotion by RBN media outlets.

### **Production and Broadcast of RBN Weekly Radio Programming**

During the quarter, RBN aired an average of 1,000 minutes of radio programs each month, reaching at least 120,000 Gobi listeners. Programs kept to the standard format and content, which includes 'Market Watch', 'Weather Watch', 'Learning Agribusiness', 'Business Mirror', and 'Feature Success Stories', all striving to give better and more useful information and in-depth tips. Broadcast schedules remained the same and program formats included a mix of live sound bites and studio recording and maximum use of natural sound. The radio continues to be the most effective media to reach the rural population in the Gobi region.

### **Herder from the Future Radio Drama (25 programs)**

In the third quarter, RBN continued working on the scripting of the 2005 series of 'Herder from the Future' (HFF) radio drama. As reported earlier, topics were identified with input from GI clients and staff. By the end of August, episodes 100-126 were finished and the production (selecting actors and recording voice/sound bites) started with Mongol Radio, with the program to be aired next quarter.

### **Production and Dissemination of Market Watch**

'Market Watch' continued to provide demand-driven price information. RBN, using its nationwide 'Market Watch' network, gathers highly-valued commodity price information and disseminates it to GI clients and other herding and non-herding businesses throughout the country.

The RBN-509 SMS service continued operating during the period, with an average of 1,000 hits per month. The 'Market Watch' radio program included 44 different commodity prices, with an emphasis on raw materials, as herders were actively involved with meat, skins/hides and cashmere sales during the quarter. RBN also started collecting information on raw milk and timber/wood prices in response to requests from rural business operators.

The RBN magazine continued to offer a 'Market Watch' insert, highlighting cashmere and skins/hides, meat, and other raw material prices. The insert also included analyses and details on the factors influencing price fluctuations and forecasts. The insert, with market reports, also provided useful tips in recognizing different markets and prices and types of agricultural markets.

'Market Watch' continued broadcasting a twice-monthly TV program on Mongol National TV. Pact/RBN journalists regularly anchored the program during July and August. The September program had some

changes when RBN TV covered four of the six market events co-organized by GI (print and radio covered all market events) and included the program in the Market Watch TV program.

Overall, "Market Watch" continues to provide herders and non-herding business operators with information enabling them to make decisions about which markets to access and at which prices to sell their products, thus meeting its objective of helping to eliminate regional price differentials.

### **RBN Website**

Pact has updated the RBN website ([www.rbn.mn](http://www.rbn.mn)). The website pulls together all rural business news reported elsewhere as part of RBN services and products, targeting primarily rural business people who have access to the internet.

### **Production and Broadcast of RBN TV Programming**

RBN produced six prime-time television programs during the quarter. Programs were produced and aired in collaboration with Mongol TV. Business operators and cooperatives that were featured on the programs included Gobi clients, and RBN provided at least two opportunities for them to advertise their products nationwide and to share their experience with others.

On September 3<sup>d</sup>, RBN began broadcasting a 26-episode TV drama series on Mongol TV. The new 26-part educational TV drama entitled "Endless Labyrinth" tracks the efforts of a rural family to develop and operate a small rural business and the challenges that they face in researching the local market, securing financing, producing a quality product, managing the business, and dealing with corruption issues. A sample episode translation of episode 12 - "Chimdee the Iron", from the new 26-part educational TV drama entitled "Endless Labyrinth" is attached as Appendix 8.

### **Activity Two: Local Capacity for Information Dissemination and Communication**

During this reporting period, no significant activities were implemented towards building local capacity for information dissemination and communication.

## **COLLABORATION WITH GOVERNMENT OF MONGOLIA AND OTHER PROJECTS**

The First National Conference of Yak Breeders was held in Ikhtamir soum, Arkhangai on August 1st and 2nd, with over 120 conference delegates from across Mongolia. GI herder clients from Bayanhongor, Uvurhangai and Umnugovi participated in the conference. Mr. Ts. Gankhuyag, Deputy Minister for Food and Agriculture opened the conference with a keynote speech on current conditions of yak breeding and future plans of the Ministry to support the Yak livestock sector. Also during the quarter, GI program clients from Gobi-Altai participated in the Government-sponsored "Zavkhan Partnership 2005 Trade Fair" for the western region, held in Uliastai town on August 16th and 17th. The clients sold their products at the fair and had the chance to meet other herders from different aimags and share experiences and discuss the challenges faced in their business diversification activities.

"Green Revolution 2005", a government-sponsored training seminar on vegetable and fodder crop production took place in Uvurhangai in August 2005. A number of Gobi Initiative herder clients that are implementing vegetable and fodder crop business plans attended the event, and were able to exchange experiences and discuss vegetable cultivation in the Gobi region with other producers. The GI program also facilitated the participation in the event of all aimag-based vegetable and fodder crop consultants. The participants also visited 'Aviat Aman Bulag', the GI-supported cooperative that has cultivated 95 hectares of oats with technical assistance from GI and the local government.

In Ulaanbaatar, Mercy Corps staff continue to meet on a periodic basis with other implementing agencies and with consultants engaged to design and/or evaluate donor-funded rural economic development programs. Meetings were held with World Bank staff evaluating the "Sustainable Livelihoods Project", during which the opportunity to expand the Gobi Forage project into Tuv aimag, with funding from the Sustainable Livelihoods Program, was discussed. Consultants from the USAID-funded, "Last Mile Initiative" visited Bayanhongor; the GI aimag office assisted with the field travel and arranged meetings with aimag government officials, the law courts, schools, the banks and private businesses.

The Ulaanbaatar-based program officers continue to collaborate with a number of organizations that are working on community-based tourism activities. The organizations include GTZ, UNDP, VSO, WWF and the Hustai National Park. The group has been meeting on a monthly basis to cooperate on marketing efforts and on the promotion of small herder-based ger camps. In early October, a workshop was organized by the group entitled, "Community-based tourism in Mongolia - current trends and future directions". The workshop was designed to provide participants with an opportunity to discuss the obstacles and challenges faced by small herder-operated ger camps and other tourism-based activities, and to discuss the creation of a member-based umbrella organization based in Ulaanbaatar. Five GI herder clients that are currently implementing tourism business plans participated in the workshop. The participants all stated that the main challenge they face is marketing their operations and securing guests. The concept of the umbrella organization was keenly discussed and the participants were enthusiastic about establishing the organization over the winter months, with the primary objective of promoting the services and camps of the members at the start of the 2006 tourist season. Ultimately the umbrella organization would provide its members with marketing assistance, establish minimum standards for health and safety, and standardize services provided by herder operated ger camps.

The Dundgovi office, in collaboration with the Dundgovi Youth' NGO, has continued co-implementation of a small business development project for young entrepreneurs, funded by private donors of Mercy Corps. Ten young entrepreneurs are currently implementing various "start-up" business plans. Total sales for these ten small businesses for the third quarter of the year are MNT 9.7 million. Of the ten young entrepreneurs that have established new businesses, three businesses have established themselves as successful operations and will be mainstreamed into the Gobi Initiative program to become long term non-herder business clients. These include a café/restaurant and a chicken farm selling fresh eggs, both located in the aimag center, and a hairdressing business located in Deren soum.

## **PROGRAM/FINANCIAL MANAGEMENT**

There were no key staffing changes during the third quarter.

Spending through September 30, 2005 has not yet been completely finalized, but preliminary figures indicate cumulative expenses of \$ 2,816,708. This amount is composed of the following:

UB Project Management	683,485
UB Program Delivery	545,249
Aimag Program Delivery	681,712
PACT/RBN	616,142
Indirect Cost	290,120
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TOTAL	\$2,816,708

The reallocation of Program Delivery expenses into "target group" results in the following:

UB Project Management	683,485
Herder Businesses	681,197
Non-Herder Businesses	343,936
Local Government/Other (market events, etc)	201,828
PACT/RBN	616,142
Indirect Cost	290,120
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TOTAL	\$2,816,708

## **CONCLUSIONS AND RECOMMENDATIONS**

Overall, the project is on schedule. The herder clients are busy with the implementation of their businesses plans and with the summer coming to an end, much of the 'production' activities are being finalized and the herders are now selling their products. Of the thirty seven herder clients engaged in dairy production, twenty

clients have successfully met their production and sales targets. However, the clients engaged in vegetable and fodder crop production have seen mixed results; overall there has been an increase in yields, but there still remains room for improvement through continued technical advice and targeted training. The market demand for fresh dairy products and Mongolian-grown vegetables continues to grow, as was witnessed at the market events where, almost without exception, all GI client dairy products and vegetables were quickly sold. The program continues to use sales generated from the new business activities outlined in the formal business plans as an indicator of success. As of September 30<sup>th</sup>, 2005, total sales of MNT 749,966,128 had been generated by 152 groups.

The work with non-herder business clients is ongoing. A total of 25 businesses have completed business plans, accessed financing and received targeted training and technical assistance. During the final quarter, GI staff and consultants will make a special effort to evaluate the assistance provided during the year and undertake a more rigorous study of impact on the businesses.

The Mercy Corps loan guarantee mechanism continues to be a crucial component of the program and remains instrumental in linking rural businesses (particularly herder businesses) to the financial services sector. There are no delinquencies or defaults to date; this can be attributed to the successful production and sales achieved by the clients.

The highlights of the quarter were the market events in the six aimags. The Prime Minister of Mongolia, Mr. Ts. Elbegdorj, and the US Ambassador officially opened the Dundgovi event. The visit generated a large amount of press coverage of GI activities and recognition of the impact that the program is beginning to have on the rural economy. The market events generated a total sales of 241,467,265 MNT (215,600 USD), with all GI clients participating and selling their products. The success of the market events and the sales generated demonstrate that a 'local market for local production' exists and consumers will pay a premium for local products. This is the second year that these expanded events have been organized and in order to increase both the scale and the popularity of the events, a series of cultural and children's activities were added. As a result, the market events have evolved into "county fairs", similar to those that are still prevalent in rural America. This year, the GI program officers worked hard to ensure the involvement of the local government officials and other stakeholders in the organization and financing of the event. With the success of the events this year, it is hoped that they will become annual events with the aimag government and other key community institutions taking the lead on organization and implementation.

The program continues to work closely with local aimag and soum government officials by providing specific technical training and by assisting with, and participating in, government-organized events. GI recognizes the importance of assisting local government to understand their role in promoting the growth and development of private sector-led business development in the rural aimags. During the last quarter of the year, the aimag program officers will increase training activities with government officials to enable them to (a) better advise rural businesses on Government regulations and standards and how the businesses can comply with the regulations, and (b) provide technical advice on key business issues such as financial accounting, taxation, business planning, and health and safety standards.

Business dissemination efforts have continued to be successful. Although RBN print demand seems to remain mostly static, there is increased demand for the radio and television programming. The new TV drama series was completed and began airing during the quarter; informal feedback received by the Pact/RBN staff has been positive and the series is reaching the rural residents. During the last quarter, an assessment of the reach of the series will be conducted.

At this point in time, Mercy Corps and Pact have no recommendations for any material changes to the GI Phase II program.

This concludes the Year Two Third Quarter Report.

Attachments to this Report are:

- Appendix 1: Details of Herder Client Sales during the First Nine Months of 2005
- Appendix 2: Market Event Summary September 2005

- Appendix 3: Photographs from the 2005 Market Events in the Gobi Initiative Target Aimags
- Appendix 4: Report on the Opportunities and Constraints for Vegetable Cultivation in the Gobi Region of Mongolia
- Appendix 5: ILO The 2005 Reader, From BDS to Making markets work for the poor; Example 43: Enabling Remote Rural Herders to Diversify their Economic Activities Mercy Corps and PACT in Mongolia
- Appendix 6: The 'Herders' Tip' from RBN edition #43 - FAQs about rangeland management in summer
- Appendix 7: An example of the advertisement prepared for the 26 part TV drama entitled "Endless Labyrinth"
- Appendix 8: Translation of episode 12 - "Chimdee the Iron", from the new 26-part educational TV drama entitled "Endless Labyrinth"

**DETAILS OF HERDER CLIENT SALES DURING THE FIRST NINE MONTHS OF 2005 - Annex 1**

		Name	Soum	Type	Activity	Revenue				
						Planned Sales CY2005	Actual Sales CY2005 (MNT)			
							Jan-June	July	August	September
										Total Sales to Date
1	1	Aviat Aman Bulag	Zuunbayan	C	fodder production	24,000,000	0			0
2	2	Taatsiin huh arvai	Baruunbayan	C	fodder production	810,000	0			80,000
3	3	Badama Junnai	Ulziit	C	hay production	2,980,000	0			0
4	4	Ikhsalhit	Bayan undur	C	hay production	10,080,000	0			0
5	5	Zuunbogdiin Uguuj	Bogd	P	vegetable/fodder production	5,781,250	0			980,000
6	6	Mazar bayanhangai	Tugrug	C	vegetable production	6,199,000	0			4,450,000
7	7	Barchin zalaa / Ikhsalaa	Hairhandulaan	C	vegetable production	5,425,000	0			105,000
8	8	Munkhcurvan Khairkhan	Nariinteel	C	vegetable/fodder production	5,956,000	0			2,105,000
9	9	Ugalz Buman Sureg	Tugrug	C	vegetable/fodder production	2,172,200	0			1,740,000
10	10	Uguuj Teel	Nariinteel	C	vegetable	1,950,400	0			1,262,000
11	11	Bayanzulegt	Hujirt	C	dairy products	5,220,000	0	2,900,000	1,330,000	1,200,000
12	12	Uguuj Chandmana	Tugrug	C	dairy products	6,975,000	1,192,050	915,000	1,065,950	1,418,400
13	13	Shimt sureg	Arvaiheer	C	dairy products	8,320,000	520,000		300,000	300,000
14	14	Ideenii deed	Uyanga	C	dairy products	1,800,000	275,000	100,000	150,000	1,650,000
15	15	Huduugin amidral	Bayangol	C	dairy products	2,940,000	0	800,000	324,000	800,000
16	16	UUMAA	Harhorin	HG	dairy products	5,625,000	1,376,550	1,516,550	1,418,550	1,600,000
17	17	Munkhbulag-suu	Harhorin	HG	dairy products	3,480,000	387,500	370,000	335,000	750,000
18	18	Taliin uguuj	Bogd	HG	dairy products	7,336,000	0	1,195,000	1,195,000	1,250,000
19	19	Urhukh dulguun	Zuunbayan	C	meat production	5,286,000	0			
20	20	BVG	Arvaiheer	P	meat production	11,745,850	0			
21	21	Mungun zalaa	Harhorin	HG	meat/chicken farm	4,104,000	0	200,000	103,000	132,500
22	22	Munkh turuu	Bogd	P	felt products	2,991,000	0	390,000	56,000	1,575,000
23	23	Danshiig denj	Usunzuil	C	felt products	2,100,000	0		500,000	1,610,000
24	24	Hiadiin Gobi	Burd	C	felt products	1,070,000	0	400,000	275,000	371,000
25	25	Dulguun devshil	Zuunbayan	C	felt products	4,000,000	0		4,000,000	1,145,000
26	26	Bayandulguun	Usunzuil	C	ger camp	13,090,000	0	660,000	980,000	1,995,000
27	27	Hiimorit tahlga	Nariin teel	C	hotel, restaurant	6,425,000	1,680,950	1,039,000	350,000	150,000
28	28	Nutgiin buyan	Usunzuil	HG	restaurant	5,220,000	2,183,100	822,700	731,800	731,800
29	29	TMZA	Tugrug	P	veterinary service	8,837,440	5,766,700	2,457,000	1,796,000	135,000
30	30	Uzmen ish	Bogd	P	veterinary service	5,468,200	2,425,600	20,000	20,000	1,950,000
31	31	Jargalant gol / ??? ?????	Burd	P	veterinary service	8,796,730	6,426,610		1,860,000	56,800
32	32	Usguh-Erdene	Baruunbayan	C	gas station	158,900,000	77,781,000	18,660,000	19,000,000	19,500,000
33	33	Ukhkhaa hudag	Bogd	P	service/electric appliance	6,530,000	2,098,500	685,000	685,000	950,700
34	34	Ov-TAN		LLC	Dairy production	7,792,000	0			3,335,000
<b>UH TOTAL</b>						<b>359,406,070</b>	<b>102,113,560</b>	<b>33,130,250</b>	<b>36,475,300</b>	<b>53,328,200</b>
35	1	Badrah Shand	Sumber	C	vegetable/hay production	4,770,000	0			1,436,600
36	2	Sumber Tsagaan Temeet	Sumber	C	hay production	4,000,000	633,000			1,554,000
37	3	Bor togoot / Baga sansar	Sumber	C	hay/vegetable production	6,362,500	0		150,000	1,440,000
38	4	Devjikh /Tevshnii hajuu us	Sumber	C	dairy products	10,140,000	185,000	550,000	663,000	1,180,000
39	5	Bishrelt sumber	Sumber	C	dairy products	8,850,000	601,000	510,000	2,600,000	2,793,500
40	6	Doshin jirem	Shiveegovi	HG	dairy products	11,400,000	4,300,000	2,165,000	4,220,000	1,551,400
41	7	Ikhsal uul	Bayantal	C	dairy products	17,915,500	11,831,000	2,444,000	1,800,000	2,300,000
42	8	Tsavchirilin ekh	Tsagaandelger	C	meat production	11,690,000	8,798,000	100,000	330,000	300,000
43	9	Heentsii	Sumber	HG	dairy production	21,364,000	11,804,000	210,000	740,000	120,000
44	10	Mandal Sansar	Shiveegobi	C	summer camp/ hay prod	7,800,000	648,000	233,000	84,000	865,000
45	11	Hudulmuriin och	Sumber	LLC	Veterinary service	16,043,000	2,249,000	537,000	448,000	672,000
<b>GS TOTAL</b>						<b>120,335,000</b>	<b>41,049,000</b>	<b>6,749,000</b>	<b>11,035,000</b>	<b>14,212,500</b>
46	1	Baidragiin Khishigt	Bumbugur	C	vegetable production	3,540,000	0			1,800,000
47	2	Tsagaan undraga	Baatsagaan	C	vegetable/fodder production	1,720,000	0			270,500
48	3	Modon Ovoonii Ekhlal	Jinst	C	vegetable production	2,500,000	0			700,000
49	4	Tsenheriin Tsuurai	Bayan-Undur	C	vegetable production	1,800,000	0			900,000
50	5	Altan teel	Bayan-undur	HG	vegetable/fodder production	1,220,000	0			300,000
51	6	Shuuj bayan orgil	Bayanlig	C	vegetable production	3,100,000	0			1,260,000
52	7	Ulziit hyariin orgil	Ulziit	C	vegetable production	4,250,000	0	75,000	75,000	900,000
53	8	Asgamba	Bayan ovoo	C	vegetable production	7,350,000	0			5,285,000
54	9	Baruun nuur	Buustagaan	C	vegetable production	1,950,000	0			190,000
55	10	Shirgiin hudag / Erdene teel	Bayan-Undur	C	vegetable production	1,960,000	0	514,000		300,000
56	11	Har khud / Ikhsal maihan	Bayan-Undur	C	vegetable/fodder production	3,480,000	0			600,000
57	12	Gurvan tsahir	Buustagaan	C	vegetable production	4,216,000	0	195,000	250,000	3,895,000
58	13	Hoolt ehlek	Bayan ovoo	C	vegetable production	2,875,000	0			2,140,000
59	14	Tovgoriin dalan	Baatsagaan	C	vegetable production	3,165,000	0			721,400
60	15	Vant hairhan / Hoshoot hairhan	Erdenetsogt	C	vegetable production	4,550,000	0			600,000
61	16	Suun bulag / Shargalzuut	Bayanhongor	C	dairy products	2,875,000	200,000		450,000	600,000
62	17	Buyant hongor	Erdenetsogt	C	dairy products	2,800,000	385,000	240,000	140,000	250,000
63	18	Jargalant-Sumber hairhan	Erdenetsogt	C	dairy products	4,350,000	455,000	300,000	200,000	580,000
64	19	Mandal	Jargalant	C	dairy products	2,890,000	570,100	390,000	300,000	863,000
65	20	Zuliin dul	Galut	C	dairy products	4,875,000	325,300	1,200,000	450,000	797,800
66	21	Sarlagiin shim	Zag	C	dairy production	3,840,000	0	120,000	150,000	340,000

67	22	Jalanger ovoo/ Zalan	Gurvan bulag	C	dairy products	2,478,000	90,100	150,000	150,000	949,400	1,339,500
68	23	Orogiin dolgio	Bogd	C	felt production	2,220,000	150,000	200,000	100,000	560,000	1,010,000
69	24	Ikher gurvan bulag / Bayan	Gurvan bulag	C	felt production	4,166,000	0			471,100	471,100
70	25	BNE	Bayan undur	C	Veterinary service	6,933,000	1,860,000	1,895,000	1,000,000	1,250,000	6,005,000
71	26	Eruul urjihui	Galuut	C	Veterinary service	5,950,000	1,740,000	590,000	500,000	1,152,000	3,982,000
72	27	Mongol ovoo	Baatsagaan	LLC	Veterinary service	5,995,000	2,425,000	984,000	500,000	230,000	4,139,000
73	28	Munkh burgas	Baatsagaan	C	meat production	15,152,000	2,295,000	1,683,500	1,700,500	908,700	6,587,700
74	29	Uutiin urlal /Tsagaan turuut	Galuut	C	skin products/felt shoes	7,034,000	1,307,500	1,720,000	500,000	431,800	3,959,300
75	30	Ikher bogd Urgun	Bayangovi	C	fuel brick	12,500,000	0			610,000	610,000
76	31	Gan bogd /laboratory	Bayanhongor	LLC	Veterinary service	1,616,200	0				0
BH TOTAL						133,350,200	11,803,000	10,256,500	6,465,500	29,855,700	58,380,700
77	1	Har hairhan	Saihan ovoo	P	Vegetable	2,750,000	0			1,260,000	1,260,000
78	2	Togtokh tav	Saintsagaan	P	dairy products	2,920,000	0			950,000	950,000
79	3	Alagiin Devshih	Deren	C	airag production	4,450,000	0	320,000	780,000	2,508,000	3,608,000
80	4	Esunbulag	Adaatsag	NGO	dairy products	2,720,000	0		256,000	1,658,060	1,914,060
81	5	Shine sanaa	Adaatsag	P	dairy products	2,892,400	0			940,630	940,630
82	6	Bulag	Saintsagaan	HG	meat production	14,830,000	3,330,000			2,890,000	6,220,000
83	7	Busiin hugjil	Saintsagaan	C	meat product	14,410,000	0			3,970,650	3,970,650
84	8	Aduunii hiimori	Delgerhangai	P	meat product	13,600,000	0			6,200,000	6,200,000
85	9	Eviin huch	Govi ugtaal	HG	meat product	8,320,000	7,762,000		678,000	879,600	9,319,600
86	10	Oldokhiin Devjikh	Khuld	C	meat production	8,040,000	1,335,000		2,500,000	1,870,000	5,705,000
87	11	Tsagaan chuluut	Deren	NGO	meat product	25,590,000	910,000			4,560,800	5,470,800
88	12	Logiin Gobi	Saintsagaan	C	meat production /pork	3,978,000	0				0
89	13	Uul	Khuld	HG	meat product	7,230,500	315,000	685,000		2,000,000	3,000,000
90	14	Gal Michid	Luus	C	felt processing	6,180,000	0	925,000	3,342,000	1,350,000	5,617,000
91	15	Shuvuutai hairhan	Khuld	P	felt products	6,000,000	0		562,500	2,506,030	3,068,530
92	16	Shar shuvuutai	Khuld	P	felt products	6,000,000	0		260,000	3,852,000	4,112,000
93	17	Ikher buurtsag	Saikhano-ovoo	P	felt products	2,850,000	0		600,000	1,680,000	2,280,000
94	18	Halzan dalai	Erdene dalai	C	ger camp	3,800,000	956,000	360,000	550,000	780,450	2,646,450
95	19	Altgana ulziit	Ulziit	C	veterinary service	9,434,000	3,642,000	2,558,000	1,020,000	870,000	8,090,000
96	20	Ugtaal chandmana	Govi-ugtaal	C	veterinary service	8,050,400	3,423,000	3,000,000	808,400	289,600	7,521,000
97	21	Borjigon Erdene	Bayanjargalan	LLC	veterinary service	9,924,000	2,280,000	4,382,000	1,104,000	694,200	8,460,200
98	22	Togrogiin Igeltseel	Khuld	C	trading-sale of raw	45,928,000	15,486,000	6,000,000	3,000,000	3,850,600	28,336,600
99	23	Buyanbulag	Ulziit	NGO	shoes making	5,900,000	909,000	125,000	300,000	460,000	1,794,000
100	24	Delgerbulag	Bayanjargalan	HF	shoes making	6,580,000	1,410,000	150,000	790,000	800,000	3,150,000
101	25	Bayanteeg	Saikhanoovoo	P		4,694,500	150,000	250,000	120,000	1,450,000	1,970,000
102	26	Bayanbulag	Ulziit	HF	bakery production	3,840,000	300,000	300,000	160,000	300,000	1,060,000
103	27	Arvindalai	Saihan ovoo	HG	vegetable	5,950,000	0		150,000	960,800	1,110,800
104	28	Shar ereg	Saihan ovoo	HG	vegetable	2,000,000	0		450,000	900,800	1,350,800
DG TOTAL						238,861,800	42,208,000	19,055,000	17,430,900	50,432,220	129,126,120
105	1	Bayan sharga	Sharga	HG	Vegetable production	6,210,000	0		219,800	854,240	1,074,040
106	2	Tsagaan haalga	Biger	C	Vegetable production	6,095,000	0		96,940	2,772,000	2,868,940
107	3	Gazriin uguuj	Taishhir	C	Vegetable production	6,890,000	0			650,000	650,000
108	4	Khurim bulag	Khaliun	C	Vegetable production	1,955,000	0				0
109	5	Hamtiin khuch	Biger	HG	dairy products	3,475,000	0		743,400	400,000	1,143,400
110	6	Chuluunbat	Yusenbulag	HG	dairy products	3,581,000	0	761,700	180,000	1,138,300	2,080,000
111	7	Umuukh Buyan	Yusenbulag	HG	dairy products	7,235,500	960,000	210,000	170,000	772,500	2,112,500
112	8	Baatar dan	Chandmana	C	dairy products	1,937,500	0	250,000	586,600	541,000	1,377,600
113	9	Durvun ovoojoo / Devshil	Yusenbulag	P	dairy products	5,923,000	0	530,000		1,095,500	1,625,500
114	10	Buraat bulag	Tugrug	HG	dairy products	1,600,000	510,000	35,000		212,000	757,000
115	11	Arsain tsenkher / Ulziit	Yusenbulag	LLC	dairy products	4,125,000	192,000	261,000	432,000	460,000	1,345,000
116	12	Gangan khiits / Ikher murun	Biger	P	felt products	3,190,000	96,000	135,000	428,000	740,000	1,399,000
117	13	Erdene uul	Chandmana	C	felt products	11,515,000	90,500	1,345,000	6,625,000	875,000	8,935,500
118	14	Ovooon den	Huhmorit	C	meat products	16,680,000	0				0
119	15	Tarian ovoo	Delger	C	meat products	15,400,000	1,304,000	1,180,000	1,513,500	949,000	4,946,500
120	16	Sor manlai	Delger	P	meat products/animal breeding	22,000,000	0				0
121	17	Alatau Altai	Yusenbulag	LLC	dairy production	4,642,400	0	360,000	24,500	480,000	864,500
122	18	Usan zuil	Tonhil	HG	Restaurant	8,269,000	1,954,000			790,000	2,744,000
123	19	AMT BAL	Tseel	LLC	Veterinary service	13,660,000	3,361,400		3,614,000	2,518,600	9,494,000
124	20	Bat bukh	Bugat	C	Veterinary service	7,470,000	2,899,500	699,500	1,800,000	1,400,000	6,799,000
125	21	Deed Oglog	Tseel	C	vet services	7,332,000	3,325,930	1,721,000	1,688,000	1,552,000	8,286,930
126	22	Gune bulag	Jargalan	LLC	Veterinary service	5,636,000	2,154,360	678,700	700,000	1,384,940	4,918,000
127	23	Shunhan	Chandmana	LLC	Veterinary service	5,948,500	1,713,000	1,000,000	750,000	1,855,720	5,318,720
128	24	Tsagaan baavgai	Dariv	C	Veterinary service	5,986,000	1,192,500	1,140,000	192,000	3,607,500	6,132,000
129	25	Ajiin Gerel	Altai	C	gas station	21,670,000	3,322,000	1,850,000	1,614,000	538,000	7,324,000
130	26	Tsonj	Delger	C	Lime	3,130,000	30,000	150,000		545,000	725,000
131	27	Tsagaan gol	Bugat	C	Hay	8,460,000	0				0
132	28	Altain devshil	Tseel	C	bekary	9,777,600	545,000		84,200	270,000	899,200
133	29	Ikher ovoo trade	Yusenbulag	LLC	sale of dairy products	1,049,600	0	40,000	45,000	141,000	226,000
GA TOTAL						220,843,100	23,650,190	12,346,900	21,506,940	26,542,300	84,046,330
134	1	Aduut Gobi	Hurmen	C	vegetable production	3,201,000	93,000		178,500	1,800,000	2,071,500
135	2	Nariin har	Hanhongor	HG	vegetable production	940,000	0		74,550	520,000	594,550
136	3	Orgil bulag	Hanhongor	HG	vegetable production	8,960,000	0		484,600	1,900,000	2,384,600
137	4	Uuriin tuyaa	Tsogt-Ovoo	HG	vegetable production	800,000	0			450,000	450,000
138	5	Gobi Tulga	Hanhongor	C	fodder production	8,232,000	0			4,000,000	4,000,000
139	6	Jasrgalantiin itgeltseel	Bayandalai	C	fodder production	3,335,000	0		175,000	265,000	440,000
140	7	Zuramtain devshil	Bayandalai	P	fodder production	2,385,000	0		50,000	350,000	400,000
141	8	Oyut	Hanhongor	P	dairy products	8,280,000	200,000	3,500,000	1,428,000	2,500,000	7,628,000
142	9	Bayan bayalag	Nomgon	HG	dairy products	2,600,000	0		100,000	345,000	445,000

143	10	Duulga	Hanhongor	P	dairy products	950,000	140,000		1,859,000	600,000	2,599,000
144	11	Bayan-Undur	Hurmen	P	dairy products	2,575,000	0			1,600,000	1,600,000
145	12	Sarlag	Bayandalai	HG	dairy products	3,760,000	0			2,800,000	2,800,000
146	13	Huren Hana	Noyon	HG	felt products	2,314,500	601,250	473,000	1,091,000	70,000	2,235,250
147	14	Chandmana erdene	Bayandalai	HG	felt products	3,000,000	0			1,500,000	1,500,000
148	15	Bayan hairhan	Hanhongor	P	felt products	690,000	30,000	55,000	30,000	300,000	415,000
149	16	Anh san	Bulgan	C	tourism	5,200,000	1,124,500	181,000	1,009,550	1,951,000	4,266,050
150	17	Altan goviin shiree	Bulgan	C	tourism	9,900,000	0	340,000	500,000	4,000,000	4,840,000
151	18	Avrah	Hanhongor	HG	tourism	3,860,000	135,000		5,700,000		5,835,000
152	19	Serven hairhan	Sevrei	HG	Hotel service	3,520,000	1,462,000		159,600	400,000	2,021,600
153	20	Darkhan govi 2 / Saijrah	Hanhongor	LLC	tourism	10,275,000	0	3,500,000	600,000	1,100,000	5,200,000
154	21	Bayan bilgeh	Tsogt-Ovoo	HG	animal breedinf/ goat	2,795,000	2,100,000				2,100,000
155	22	Naran Zug Melmii	Noyon	P	veterinary services	3,071,500	623,700		1,521,000	1,647,100	3,791,800
156	23	Bumbat urjih	Tsogttsetsii	P	veterinary services	2,287,000	310,100	37,850			347,950
157	24	Han javhlant	Hanbogd	C	veterinary services	1,643,200	956,400	40,040	157,160	38,268	1,191,868
158	25	Sod bayalag	Nomgon	HG	trade	11,880,000	3,900,000	842,000	3,395,000	1,115,000	9,252,000
159	26	Enger Tsagaan Khairhan	Tsogttsetsii	LLC	gas station	100,700,000	47,000,000	15,000,000	7,000,000	33,390,000	102,390,000
160	27	Galbiin hugjil	Hanbogd	C	trade	16,578,000	3,019,000	1,028,000	312,000	2,538,000	6,897,000
161	28	Harmagtain buur hairhan	Nomgon	C	wooden products	2,970,000	250,000			130,000	380,000
162	29	Goviin buyn delgerekh	Tsogt-Ovoo	C	animal breeding/fodder	5,350,000	124,000			2,120,000	2,244,000
UG TOTAL						232,052,200	62,068,950	24,996,890	25,824,960	67,429,368	180,320,168
HB TOTAL						1,304,848,370	282,892,700	106,534,540	118,738,600	241,800,288	749,966,128



**Annex 2:**
**MARKET EVENT SUMMARY SEPTEMBER 2005**

	<b>Umnugovi</b>	<b>Govi-Altai</b>	<b>Govi-Sumber</b>	<b>Bayanhongor</b>	<b>Dundgovi</b>	<b>Uvurhangai</b>
Dates:	02-03 September	09-10 September	15 September	17-18 September	24-25 September	23-25 September
Co-Organizers:	Umnugovi Aimag Gov't Agriculture Ext Centre Herder Initiative NGO	Govi-Altai Aimag Gov't Department of Agriculture Chamber of Trade/Industry	Govi-Sumber Aimag Gov't Department of Agriculture TACIS Project	Bayanhongor Aimag Gov't Chamber of Trade/Industry Best Products Committee	Dundgovi Aimag Gov't Saintsagaan Soum Gov't World Vision Bayantsagaan Herder Assoc	Uvurhangai Aimag Gov't Arvaiheer Soum Gov't Chamber of Trade/Industry Disabled People's Project
MPs Attending:	D. Bat-Erdene	T. Ochirhuu	L. Odonchimed		The Prime Minister of Mongolia; Ts. Elbegdorj J. Narantsatsralt R. Rash	
Financial Supporters:	Tavan Tolgoi Co, Ltd Ivanhoe Mines Mongolia BHP Billiton Umnugovi Aimag Gov't Environment Inst of NZ Mongol Gobi Dev Fund Protected Areas Admin Veterinarian Agency Producers/Coops Ass'n Employers Association Rural Womens Dev Fund Liberal Womens Fund Aya Bagsh NGO Local Companies (3) Commercial Banks (5)	Govi-Altai Aimag Gov't Chamber of Trade/Industry Department of Agriculture Mobicom Standard/Measurement Ctr Shargaljuut Co, Ltd Asian Development Bank	Govi-Sumber Aimag Gov't Sumber Soum Gov't TACIS Project	Bayanhongor Aimag Gov't Chamber of Trade/Industry Sports Association Univ of Trade/Production Standard/Measurement Ctr Shargaljuut Co, Ltd Mobicom Skytel Theatre of Folk and Drama XacBank Naran Hevlel Workshop Monos Petroleum Co, Ltd	Dundgovi Aimag Gov't Saintsagaan Soum Gov't World Vision Mandalgovi Huns Co, Ltd Goviin Tenger Co, Ltd Commercial Banks (3) Local Companies (16) Communication center Dundgovi Youth NGO Tax department Social Security Office	Uvurhangai Aimag Gov't Chamber of Trade/Industry Department of Agriculture UH Hiimori Foundation Commercial Banks (3) Local Companies (40) Communication Center
Total Sales:	MNT 39,200,000	MNT 26,000,000	MNT 19,700,000	MNT 25,500,000	MNT 38,000,000	MNT 76,622,000
Exhibitors:	130	127	98	346	168	165
Attendance:	10,000	8,200	6,200	8,500	14,000	20,000
Most Sales:	Dairy products, carpets	Dairy products	Dairy products, vegetables	Dairy products, sausages	Fermented mare milk, dairy products	Dairy products, vegetables
Grand Prize:	20 m white seamless felt produced by Chandmani Erdene HG	Ger felt produced by Entum Co, Ltd	Vegetables from Emeelyn Hishig Hond partnership	Bakery products from Sulden Tenger cooperative	Soft drinks from Mandalgovi Huns Co, Ltd	Bakery and food products from Delgereh Huns Co, Ltd


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**Annex 3: Photographs from the 2005 Market Events in the Gobi Initiative Target Aimags**



The US Ambassador Ms. P. Slutz at the Dundgovi Trade Fair opening ceremony. On her right hand side is the Prime Minister of Mongolia Mr. Ts. Elbegdorj



The Prime Minister talking to an exhibitor selling a traditional silver bowl





Traditional pack camels at the Umnugovi Aimag trade fair



Visitors at the Bayanhongor Aimag trade fair





Exhibitors selling vegetables





Traditional boots



Traditional wood carving



Dairy products for sale at Uvurhangai Aimag trade fair





Dairy products for sale at the Dundgobi Aimag trade fair



Barley biscuits on sale at the Bayanhongor Aimag trade fair from a Gobi Altai Aimag producer

**Annex 4:**

**MERCY CORPS/MONGOLIA  
GOBI REGIONAL ECONOMIC GROWTH INITIATIVE  
Cooperative Agreement  
#438-A-00-04-00002-00**

**Report on the Opportunities and  
Constraints for Vegetable Cultivation in the  
Gobi Region of Mongolia**

Prepared by: Gary W. Hickman, Consultant  
August, 2005



## **EXECUTIVE SUMMARY**

This consultancy was performed over a six-week period in July and August 2005 to (a) assist Gobi Initiative (GI) staff in developing a policy related to support for vegetable production in the Gobi and hangai regions, and (b) document findings and provide recommendations related to current production efforts. The GI aimags visited included Bayanhongor, Uvurhangai, Dundgovi and Umnugovi. A formal training workshop was also conducted in Uvurhangai.

Based upon a field survey of twenty GI-supported vegetable sites currently under cultivation in the four aimags, it is possible to conclude that vegetable production in the Gobi and hangai regions of Mongolia is economically viable under certain conditions. These conditions include an adequate water supply and at least average soil conditions. There are, however, a number of specific technical issues that, if successfully addressed, could also greatly improve both the quantity and quality of vegetable production. Of primary importance is that the growing of vegetables should be concentrated in smaller land areas, thus reducing labor requirements, the quantity of inputs needed for soil improvement, and problems related to weed and pest control, while at the same time improving water use efficiency. Of equal importance is that the GI project should continue the work of building the technical knowledge and skills of the local aimag-based consultants.

The field surveys and discussions with project staff, clients, and local consumers helped to confirm that the GI model for assisting herder families in increasing income through agricultural diversification is conceptually-sound. In addition to assisting the herders directly, vegetable production is also aiding consumers through increasing the availability of higher-quality local produce. The current production limitations noted in this report can all be resolved with relative ease. A good example concerns seed. A one-time importation of high quality, locally-adaptable, open-pollinated vegetable seed can significantly improve yields to profitable levels.

At most of the sites visited, adequate irrigation water was available in both quantity and quality. In situations of more limited water resources, simple drip irrigation systems are recommended. Drip tape, emitters, fittings and filters are already available in country, and are in fact already in use in certain regions. Continuing soil improvement programs will be critical to the longer-term sustainability of vegetable production efforts. Organic matter, nitrogen and other fertilizer levels can also be increased to improve yields and profit. The soil pH levels in most locations should be decreased and effective weed management instigated in all areas. To accomplish these improvements, continuing vegetable production training will be essential for both clients and training and technical assistance providers. Local consultants should receive additional technical, and scientifically-based, training. This training should start with basic plant biology and progress to advanced vegetable culture science. Finally, additional printed materials should be developed for farmers and regular training provided at demonstration centers.

This report outlines the conditions under which vegetable cultivation should take place. It also contains specific findings and recommendations related to vegetable cultivation in the Gobi and hangai regions. A "Vegetable Production Manual" is included with the report; this Manual provides greater detail and specific technical information that can be used to address the findings and recommendations contained in this report.

## **VIABLE VEGETABLE PRODUCTION IN THE GOBI AND HANGAI REGIONS**

As noted in the Executive Summary, vegetable production in the Gobi and hangai regions of Mongolia is economically viable under certain conditions. Such production should only be supported when the following is in place:

1. An adequate water supply, defined as (a) minimum availability, during the growing season, of 250 tons per week per hectare, (b) a proper distribution system, including gasoline or electric pump capability and a gravity-fed irrigation network, and (c) sufficient water quality with a maximum pH of 8.3.



2. At least average soil conditions, defined as (a) soil pH values ranging between 6.0 and 7.5, (b) the presence of some organic matter, and (c) the absence of toxic sodium, chloride and boron (to be determined by laboratory analysis).
3. A "frost free" growing season of at least 90 days.

## **FINDINGS RELATED TO VEGETABLE CULTIVATION**

An analysis of current vegetable production practices revealed a determined effort by herders to produce for domestic consumption but also for sale at local markets. Eleven production limiting factors were noted based on field observation and discussion. If these factors are addressed through the work and activities of GI, production yields could be maximized.

- 1) Fertilizer is not always applied appropriately or in adequate amounts; especially lacking is adequate nitrogen application.
  - In many crops observed, including potatoes, cabbage, and melons, nitrogen deficiency symptoms were noted. Current farm fertilization practices range from no fertilizer/ manure addition to 40 tons of manure (collected during the socialist period) per hectare.
  - Currently, no commercial fertilizer is apparently available in the country.
  - Many current supplies of manure are stockpiles from former state farms and are non-renewable. Sheep manure, the most commonly available, is slow to break down and release nutrients. It also contains high numbers of weed seeds, which is contributing to the considerable weed problem encountered at most vegetable sites.
- 2) Information on the physical characteristics of the vegetable seed used, including planting date, length of growing period, maturity date, open-pollinated or hybrid, and determinate or indeterminate variety are often not known. For example:
  - Vegetable seed that is available sometimes includes hybrid varieties that are not suitable for producing seed to be saved and used in following years.
  - In many cases, potato "seed" comes from general market potatoes and not selected seed potato stock.
- 3) Business and Marketing plans are often based on optimistically high yields. This distorts the true economic viability of the vegetable cultivation activities.
  - World Bank figures for potato yields in Mongolia are 7.6 T/ha. Many GI business plans contain yield calculations that were estimated at 10-12 T/ha.
- 4) Most vegetable sites are too large in size for the available labor force.
  - Because of a lack of committed labor, there is an inefficient use of the land that is currently in farm production. There are often large sections that are empty, have poor plant density, and have yield- reducing levels of unmanaged weeds. As a result inefficiencies exist in water application, manure utilization (when used), and labor allocation.
- 5) The organic matter levels in most site soils are below adequate for optimum vegetable production
  - Higher levels of organic matter are needed for soil structural factors as well as improving nutrient availability for the crops.
- 6) Current weed management practices are ineffective.
  - On many farms, weeds are not removed until after competing with crops for water and nutrients, and often not until the weed seeds have matured. Also, at several sites, weeds known to be toxic to livestock are being fed to livestock. Observed toxic weeds include pigweed-*Amaranthus* species, lambs quarter-*Chenopodium* species, nightshade-*Solanum* species, and dock-*Rumex* species.

- 7) The insecticide currently in use for cabbage pests is largely ineffective.
  - Decis (deltamethrin) use is currently ineffective due to improper mixing rates and application, incorrect timing, and high water pH.
- 8) The level of technical training of local consultants in some cases is inadequate.
  - Several farmers were told by local consultants to remove the flowers from potato plants in order to increase tuber size. There is no reason to remove the flowers from potatoes as there is no improvement in tuber yields when this is done. Removing flowers actually reduces yields by taking labor away from such important tasks as removing weeds when immature.
  - Some farmers were removing leaves from the potato plant in an effort to “grow larger potatoes”. The only way a potato tuber can get photosynthate (sugars) is from the leaves. Any leaf removed will only serve to reduce yields.
- 9) Relatively high soil and water pH values are found in many areas.
  - Based on project-completed soil tests and on-site tests by the consultant, pH values are generally above 8.0. This limits the nutrient absorption ability of plants. These high pH values can particularly limit the yield of potato crops, with optimal pH values around 5.2.
- 10) Although most sites are still relatively new, the concept of crop rotation is not yet being considered.
  - Growing potatoes in the same part of the field year after year can result in serious disease problems as well as specific soil nutrient depletion.
- 11) In a few cases, farmers were attempting to irrigate fields by hand from wells.
  - A mid-season vegetable crop requires 250 tons of water per hectare per week, making it impractical to adequately irrigate any but very small fields by hand.

## RECOMMENDATIONS FOR IMPROVED VEGETABLE PRODUCTION SYSTEMS

The following are sixteen recommendations for improving vegetable production in the Gobi and hangai regions of Mongolia. Additional detail can be found in the "Vegetable Production Manual" attached to this report.

### 1. Fertilizer Use and Improvement of Soil Fertility

Fertilizers other than manure should be considered. This could include one or more of the following: bone meal, blood meal, hoof and horn meal, cover crops and chemical fertilizers.

Commercial chemical fertilizer could be used, perhaps in conjunction with manure, and application rates should be based on commercial laboratory analysis of the soil. Another option for increasing plant nutrient concentrations in the soil is the use of cover crops. These are generally leguminous plants, such as alfalfa, clover, medic, field peas, cowpeas, soybeans and other types of beans. These crops should be grown in rotating sections of the farm on an annual basis. Thus, if the farm is divided into 4 sections, one section each year will have a cover crop, the other three used for vegetable production. The cover crops are grown each summer up to the period when they are in full-flower stage. They are then cut and incorporated into the soil directly. At seeding rates of 20 kg/ha for clover, approximately 100 kg/ha of nitrogen is produced in the plants and becomes available in the soil. Half of the nitrogen produced by the cover crop is useable by vegetable crops planted the first year, and the remaining nitrogen is useable in the second year.

### 2. Vegetable Seeds

Vegetable varieties should be adapted to local conditions. This includes climate, length of growing season, and desire to save some seed from the crop for the next year's cultivation. Thus, cold-adapted, short season, open-pollinated vegetable varieties should be tested under local conditions. For potato seed, efforts should be made to experiment with different varieties from certified stock and suited for the area.

Specifically, Russet Burbank types, with good storage qualities, should be tested under Mongolian conditions.

### **3. Business and Marketing Plan Yield Estimates**

Program officers and technical consultants should work with the herder clients to help them with the development of business plans and marketing plans for vegetable production ensuring that they have realistic production yields for the vegetables. Production yield figures under Mongolian conditions for onion, potato, carrot, cabbage and melon can be found in the "Vegetable Production Manual". Examples of known yield figures can be found from various organizations such as the Ministry of Agriculture, World Bank, and Asian Development Bank.

### **4. Farm Size**

For perhaps several reasons, including the historical 'kolkhoz' model, many herders seem to want large parcels of land for farming use. In many cases, there is an inadequate labor commitment to the farm, and production per area is relatively low. Plant spacing is often less than efficient. Manure or any other fertilizer or organic matter application is definitely inadequate in most situations. All these factors lead to low yields per area, and per unit labor time.

In order to promote a more efficient use of land, manure, seed, water and labor, the program should look to encourage smaller, high intensity growing practices. High yield per square meter should be the goal, not how many hectares of land one has under cultivation.

### **5. Organic Matter**

Organic matter in soil is important for vegetable production for many reasons. One role of such organic matter is to improve soil structure – aeration, drainage, rooting, etc. Another role is to increase the cation exchange capacity of the soil, i.e. the ability of the soil to hold plant nutrients for use by crop plants. If the amount of organic matter is too low, applied fertilizers will not be held in the soil and are quickly leached out of the root zone. Based on 34 soil tests from GI-supported sites, the present organic matter ranged from 0.1% to 8.6%. Optimal organic matter levels should be around 2.0% to 5.0%. More than one-half of the sites tested have organic matter levels below 2%. Although application of manure can increase the presence of organic matter, as discussed earlier, this is probably not a sustainable prospect.

The best option is to encourage the rotational planting of cover crops. In addition to providing nitrogen to soil, cover crops also add organic matter. Legume cover crops, such as those listed in the fertilization section, produce the equivalent organic matter of 10 tons / ha of manure.

### **6. Weed Management**

Another benefit of cover crops is in weed management. Sites planted with cover crops will have substantially fewer weed problems because the densely planted legumes out-compete the weeds for water, fertilizer and sunlight. Major weeds noted at the sites included: pigweed-*Amaranthus* sp., lambs quarter-*Chenopodium* sp., morning glory-*Ipomea* sp., nightshade-*Solanum* sp., ragweed-*Ambrosia* sp., dock-*Rumex* sp., Russian thistle-*Salsola* sp. and puncture vine-*Tribulus* sp.

Chemical herbicides can be used in some situations for effective weed control. However, no single herbicide can control all weeds be safely used around all vegetable crops. Also, there appears to be little understanding of the proper use of pesticides among the new herder/farmers. Field observations made on the current use of the insecticide "Decis" (deltamethrin) show untrained people applying the chemical in a largely ineffective manner. Therefore, the widespread use of herbicides is not recommended until a system of training in the safe use and application of herbicides is developed. The availability of suitable herbicides in Mongolia is another issue that would have to be addressed.

### **7. Cabbage Insect Management**

As noted, the use of "Decis" is not necessarily the best option for pest control. A safer alternative for dealing with many caterpillars is a biological insecticide, *Bacillus thuringiensis*. It is sold as Dipel, Thuricide, and other names. It is legal to use in Mongolia according to the Ministry of Agriculture. It is

recommended that insect control trials be done to determine the effectiveness on cabbage pests under local conditions.

In at least one aimag – Uvurhangai - serious grasshopper populations were noted. With proper timing, this pest can also be managed with a safe biological insecticide - *Nosema locustae*.

## **8. Local Consultant Training**

Local consultants should receive regular technical training in vegetable crop production. This would include extension methodology as well as current scientific vegetable culture topics.

During the consultancy period, two technical training workshops were conducted for local consultants and GI Aimag-based agriculture officers. This provided an opportunity to provide a good overview of some of the findings and recommendations contained in this report. Follow up training is recommended.

## **9. High pH**

The optimal soil pH value for most vegetables, including onion, carrot, cabbage and melon is about 6.5 (slightly acidic). An acceptable range is 6.0 – 7.5. The exception is potato which should have an optimal soil pH of about 5.2. Of the 34 soil tests done by GI on soil samples from clients, 32 had pH values greater than 8.0. These high pH (basic or alkaline) conditions are significantly reducing nutrient availability and therefore vegetable yields. In the case of potatoes, the potential yield reduction is even greater. In addition to potato yield reduction, susceptibility to diseases such as scab is greatly enhanced by high soil pH.

A common method of acidifying soil is with the application of sulfur (S). In order to lower farm soil pH to more acceptable levels, this method is recommended for most vegetable sites. It should be noted that the bio-chemical process of lowering soil pH is slow, requiring more than one year to complete. The sulfur should be applied partially over an extended period of time. Sulfur is currently not commercially available in Mongolia.

## **10. Crop Rotation**

(See recommendations for fertilization, organic matter and weed management)

## **11. Irrigation Parameter for Support**

At most sites, irrigation water is gravity fed to the crop fields from nearby springs or rivers. In some cases, well water is used with small gasoline-powered pumps. At a few sites, there was an attempt to irrigate from a water well, lifting and applying water by hand. It is recommended that if well hand-lifting is the only option for a particular site, it should not be supported. One hectare of vegetables under local climate conditions will require 250,000 liters of water per week. The amount of extra labor required for hand lifting of water vs. gravity-feed or pump would make the operation inefficient and probably not economically feasible.

The best irrigation option for small-scale vegetable cultivation in the Gobi region would be gravity-fed systems from natural springs or rivers. The use of gravity-fed drip irrigation systems is an option that could be explored further. The necessary materials to build drip irrigation systems are available in Mongolia and the systems would increase the efficiency and effectiveness of water use.

## **12. Demonstration / Training Site Recommendations**

Although local consultants are available in many areas to work with farmers, good, efficient demonstration farms are fewer in number. Extension Demonstration Farms are a proven method for effective farmer education world-wide. One site observed in Mongolia is operated by Mr. Baraaduuz in Hanhongor soum, Umnugovi. It is an especially harsh site, but he has managed to improve soil conditions for good crop and tree production. An excellent tomato crop was observed, as well as good cabbage and several other vegetables. He has incorporated innovative ideas for irrigation and micro-climate manipulation. In addition, the site currently has the brick framing for a training building, three

cement ger sites and a pit toilet. With support, this would be a good site for a regional demonstration/training center. Well trained field consultants are also important in this process.

### **13. Support for Tractors**

Although they are commonly requested in business plans, tractors should only be obtained and used under certain conditions. If the number of actual average daily workers is less than 6-10, then smaller-sized plots should be encouraged that would not require a tractor. If more than 6-10 workers are available and the total productive, planted area is relatively large, then a tractor is likely to be cost-effective.

### **14. Soil Testing Equipment**

As discussed in the production manual, soil pH values are generally too high for optimum vegetable production. If chemicals are used to change the soil pH, there will be a need to measure the soil acidity on a regular basis. Each GI agricultural officer and all agricultural consultants should be equipped with pHydron, pH testing paper. With these very inexpensive kits, less than \$5.00 each, the field offices and consultants could quickly and easily test soils in their regions and provide advice to the herders.

### **15. Tunnels – 'Greenhouses'**

With market prices high in winter months for short-storage vegetables such as tomatoes and cucumbers, small commercial greenhouses are recommended. In addition to better prices, an efficient, 0.5 ha greenhouse can easily produce more vegetables than 20 hectares of field grown vegetables. In many parts of the world, for example, greenhouse tomato and cucumber yields average 14 kg per plant, 20 – 40 kg per sq meter. Current field tomato yields in Mongolia are 2 – 3 kg per sq meter. These greenhouse yields are possible in Mongolia, even in winter months, if adequate heating can be provided. Entrepreneurial growers, with sufficient loans, could construct these greenhouses in several areas of the country and have the potential of significant profit. These greenhouses should be double layer, air separated polyethylene or polycarbonate structures. Winter heating could be supplied by coal, dried manure, wood, electric heaters, gas, or recycled waste heat from power plants. Ventilation could be passively designed and air circulation fans could be electric or solar electric powered. A “bag-culture” growing system, easily adapted for supplies available in Mongolia, is recommended. Complete detailed plans, material lists, construction guidelines, and operational instructions are available from numerous sources. These details would be customized for Mongolian conditions and materials available.

### **16. Training Workshop**

A one-day training workshop was conducted in Uvurhangai for the GI agriculture officers and the local aimag-based consultants. For the workshop, a detailed, locally-adapted training manual was prepared that included a seminar outline, basic vegetable production manual, specific leaflets on growing irrigated potatoes and cabbage, and a leaflet on underground vegetable storage cellars. During the workshop, the technical information presented to the participants coincided with the findings and recommendations contained in this report.

It is recommended that a standard adult-education methodology be followed for future workshops. This includes adequate instructor preparation time, adaptation time for printed materials and interpretation, and availability of an LCD computer projector in the field.

### **Recommended Reference Book**

Maynard and Hochmuth, 1997, fourth ed., Knott's Handbook for Vegetable Growers. J.D. Wiley and Sons, NY. ISBN 0-471-13151-2

Attachments to this Report include:

Appendix A - List of GI Herder Cooperatives Engaged In Vegetable Production  
Appendix B - Scope of Work - Vegetable Cultivation Consultant  
Appendix C - Vegetable Production Manual

Acknowledgements

*I would like to thank Mr. Tornon for his facilitation during my assignment. He arranged for my logistical support and provided overall explanations that were most useful to me in understanding specific vegetable production problems in Mongolia. Thanks also to Ms. Bayarmaa for interpreting during my field visits and especially during the seminars, which were especially challenging.*

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## **Appendix A**

### **LIST OF GI HERDER COOPERATIVES ENGAGED IN VEGETABLE PRODUCTION**

#### **Bayanhongor**

1. Vant Hairhan cooperative in Erdenetsogt soum
2. Ulziit Noyon Orgil cooperative in Ulziit soum
3. Tovgoriin Dalan cooperative in Baatsagaan soum
4. Baidragiin Hishigt cooperative in Bombogor soum
5. Baruun Nuur cooperative in Buutsagaan soum.
6. Gurvan Tsahir cooperative
7. Asgamba cooperatives in Bayan-Ovoo soum
8. Hoolt Ehlel cooperative in Bayan-Ovoo soum

#### **Uvurhangai**

1. Munhugurvan hairhan cooperative in Nariinteel
2. Uguujteel cooperative to Nariinteel soum-15km
3. Barchiinjalaa herder group in Hairhandulaan soum
4. Mazarbayanhangai and Ugalzbuman sureg cooperatives in Tugrug soum Mazar bagh. – 75km
5. Zuunbogdiin Uguuj partnership in Bogd soum
6. Aviatamanbulag cooperative in Baaranbuyan Ulan soum

#### **Dundgovi**

1. Har Hairhan partnership in Saihan Ovoo soum.
2. Arvindalai herder group in Saihan Ovoo soum
3. Shar Ereg herder group in Saihan Ovoo soum

#### **Umnugovi**

1. Ankh San Cooperative in Bulgan soum
2. Altan gobiin shiree cooperative in Bulgan soum
3. Visited Mr. Baraaduuz, local consultant in Hanhongor soum

## Appendix B

# SCOPE OF WORK VEGETABLE CULTIVATION CONSULTANT USAID "GOBI REGIONAL ECONOMIC GROWTH INITIATIVE"

### Requirements:

The consultant will have significant prior experience with the development of small scale vegetable production in arid/dry regions, including (a) undertaking feasibility assessments with regard to the cultivation of vegetables in arid/dry regions, (b) evaluating client and potential client capability, and (c) providing training and technical assistance on vegetable cultivation and operations. Such experience should include work in countries that are transitioning from large-scale centralized planning and operations, and in areas within countries in which vegetable production, due to climate, limited population, and other considerations, will never be a large-scale operation.

The consultant will undertake this work in up to six (6) rural *aimags* (provinces) in southern Mongolia (Gobi desert region) and potentially in an additional three target *aimags* in western central Mongolia. In the *aimags*, program clients are already engaged in small scale vegetable production with varying degrees of success and the consultant will work primarily with these clients.

### Objectives:

The consultant will, in collaboration with MC/Mongolia staff, (a) conduct a brief survey of current vegetable cultivation conditions in the target *aimags* and identify the major problems and constraints encountered by the Mongolian herders cultivating vegetables, (b) conduct a brief assessment of the market situation (current situation and market opportunities) and identify potential opportunities for new products (raw vegetables and processed), and (c) provide training materials and information of appropriate technologies in vegetable cultivation for arid/dry regions.

The consultant will:

1. Conduct a brief assessment of the market situation (current situation and market opportunities) and identify potential opportunities for new products (raw vegetables and processed). This will enable the consultant to 'balance' his/her recommendations based on market demand and the production environment. The market analysis will provide a basis for the consultant to assess the economic viability of vegetable production in the region.
2. Undertake an assessment of current vegetable cultivation operations in the target *aimags* and identify the main constraints and problems encountered by the herders.
3. Provide detailed recommendations on potential solutions to the identified constraints and problems. This might include, but not be limited to, suggestions on alternative vegetable crops that would be suited to the climate and conditions, water harvesting techniques and irrigation systems appropriate to arid/dry conditions, appropriate pest control measures that may include integrated cropping systems and environmental preservation, the appropriateness of using greenhouses to prolong the growing season and for the production of higher value crops or vegetable seedlings in the Gobi region considering the conditions.
4. Provide information and advice with regard to the following:
  - Specific cultivation dates and production periods for vegetable crops grown in the various eco-zones of the Gobi region. This will include appropriate planting dates, harvesting dates, expected average yield considering the conditions and circumstances, etc.
  - Standard water requirements for vegetables cultivated in the various eco-zones of the Gobi. This will include advice on suitable irrigation equipment and systems, operating costs for these systems and potential suppliers.



- Appropriate methods to improve the fertility of the soil in the target regions, to include, but not be limited to, the use of manure (from livestock) and composting systems and the use of artificial fertilizers, taking into consideration the economics of the vegetable production systems and suppliers in country.
- Appropriate pest and weed control measures. This may include integrated cropping systems and alternative production and cultivation systems that will ensure that there are no long-term environmental or health-related effects from the control of weeds and pests.
- Provide advice on appropriate cultivation equipment and machinery for the size of cultivation that program clients are engaged in, such as small scale tractors, hand operated rota-tillers etc.
- Potential greenhouse design and construction materials that would be appropriate in the Gobi eco-zones and economically viable for program clients.

5. Provide detailed design information and construction of appropriate underground cellars for vegetables and on the best ways to harvest and store vegetables and how to manage the cellars during the winter so that vegetables do not go bad or rot.

6. Analyze the economics of vegetable production in the Gobi region by comparing the costs of production (taking into consideration the conditions) and the estimated revenue from sales (considering the market analysis), to provide guidance and suggestions to clients on the optimal vegetable crops to cultivate, the selling season and the actual product (i.e. 'raw' or 'processed') to be sold.

7. Design a four-day training course for *aimag*-based consultants and GI program officers to build their skills and technical knowledge in vegetable and fodder crop cultivation. This will include providing some training materials (the format of these materials and most appropriate dissemination methods will be discussed and developed in collaboration with Mercy Corps staff), and providing advice on where additional information could be sourced.

8. Work closely with MC/Mongolia program staff and will liaise as necessary with *aimag* government officials and other interested/involved parties.

### **Deliverables:**

The consultant will provide:

1. A brief weekly written report on status against scope of work objectives,
2. A comprehensive report detailing the main constraints and problems encountered by the herders and Provide detailed recommendations on potential solutions to the identified constraints and problems. The report will include a brief analysis on the economics of vegetable production in the target regions and suggestions on optimal vegetable crops to cultivate.
3. Provide detailed written recommendations on potential solutions to the identified constraints and problems as detailed in #2. Especially those related to, "water sourcing and weed/pest control".
4. Provide detailed design information and construction methods of appropriate underground cellars for vegetables. Provide advice on the best ways to harvest and store vegetables in underground cellars and advice on how to manage the vegetable cellars during the winter so that vegetables do not rot.
5. Develop some basic training manuals that compliment the recommendations and advice provided (the format of these materials and most appropriate dissemination methods will be discussed and developed in collaboration with Mercy Corps staff), and advise on additional sources of information relevant to vegetable production in dry/arid regions.

The consultant will work closely with the Gobi II Rural Economic Development Adviser, the MC/Mongolia Program Director and the MC/Mongolia Country Director, and any other consultants employed for the implementation of this work.

### **Reporting:**

The consultant will report to the Gobi Initiative Rural Economic Development Adviser

**Timeline:**

The consultancy will be for an initial 30 - day period, beginning on or about 25th July 2005 and ending on or about 26th August 2005. The days will be normal working days (Monday through Friday) unless approved in advance by the Gobi Initiative Rural Economic Development Adviser or MC/Mongolia Country Director.

# **Vegetable Production Manual for Mongolia**

Prepared for the Gobi Regional  
Economic Growth Initiative

By: Gary W. Hickman, Consultant  
August, 2005

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## Background

During July and August, 2005, an extensive field survey of over 50 current vegetable production sites in Mongolia was conducted. Visits and discussions with farmers and local consultants were made in the following aimags: Bayanhongor, Uvurhangai, Dundgovi, Umnugovi, and Zavkhan. Formal educational seminars were conducted in two locations – Zavkhan and Uvurhangai.

Based on these visits and discussions, specific observations, limitations noted and recommendations for vegetable crop production are given.

### **1) General Recommendations**

Factors	Onion	Potato	Carrot	Cabbage	Melons
Minimum Soil Temperature For Germination ( $^{\circ}\text{C}$ )	0	(plant one week before last frost)	4.5	4.5	16
Optimum Soil Temperature For Germination ( $^{\circ}\text{C}$ )	27		27	27	35
Planting Distance between Plants	5-7.5 cm	30 cm	2.5-5 cm	30-50 cm	30-75 cm
Distance between Rows	30-60 cm	60-90 cm	35-60 cm	60-75 cm	120-180 cm
Number of days to Germination	7-12	8-16	10-17	4-10	3-12
Weeks to Transplant Size	8			5-7	3-4
Days to Maturity	95-120	90-105	60-80	65-95	75-100
Yields (T/ha) Mongolia (est.)	10	10	9	12	8
Yields (T/ha) USA (actual)	44	38	34	36	20
Storage Temperature ( $^{\circ}\text{C}$ )	0	4-10	0	0	10
Storage Humidity (%)	70	90	95	98	90
Approximate Storage Period (Months)	1-8	4-9	7-9	5-6	0.5

### **2) Seeding, Transplanting and Harvest Dates**

#### Seeding Dates

The date to plant seeds is dependent on the last frost date in the area. Three estimated last frost dates selected for examples are: April 7, April 14, and May 1

#### Transplant Production Seeding Dates

To gain earlier field plant production for onion and cabbage, transplants can be started in small tunnel “greenhouses”, 3-8 weeks prior to field planting.

The estimated time to start transplant seeds is:

Crop	Last Frost Date		
	April 7	April 14	May 1
Onion	Feb 10	Feb 18	March 4
Cabbage	March 4	March 11	March 27

Direct, field, seeding dates

crop	Last Frost Date		
	April 7	April 14	May 1
Onion	April 7	April 14	May 1
Cabbage	May 8	May 15	Jun 1
Melon	(when soil temperatures are above 16 °C)		
Carrot	May 8	May 15	Jun 1
Potato	April 1	April 8	April 24

Average Expected Harvest Dates

( from direct field seeding)

<u>Last frost date</u>	<u>Onion</u>	<u>Potato</u>	<u>Carrot</u>	<u>Cabbage</u>
April 7	July 26	July 10	July 17	July 27
April 14	Aug 3	July 17	July 24	Aug 3
May 1	Aug 19	Aug 3	Aug 9	Aug 19

### **3) Fertilization**

For good plant growth and yield, significant amounts of fertilizer are required. Whether from natural soil components, chemical fertilizer or manures, the needs of the plant are the same.

#### Available Soil Nutrient Requirements

<u>Crop</u>	<u>Fertilizer (Kg / Ha)</u>		
	<u>nitrogen</u>	<u>phosphorus</u>	<u>potassium</u>
Onion	160	130	90
Potato	200	130	150
Carrot	160	110	160
Cabbage	160	90	130
Melons	130	110	110

The level of each nutrient in the soil should be determined prior to planting. If additions are needed, they can be met by chemical fertilizer or in some cases with organic materials such as manure and additional plant and animal by-products.

Current farm fertilization practices range from no fertilizer/manure addition to 40 tons of “socialist” period collections of manure per hectare. Currently, no commercial fertilizer is apparently available in the country. Many current supplies of manure are stockpiles from former

state farms and are non-renewable. Sheep manure, the most commonly available, is slow to breakdown and release nutrients. It should be applied annually at rates of 10 tons/ha. Higher annual rates of manure application, especially non-aged product, can result in salt accumulations damaging to crops. Sheep manure also contains high numbers of weed seeds, which is contributing to the considerable weed problem on most farms. Commercial fertilizer, when available, should be applied at rates of 130-200 kg/ha of nitrogen (N), 90-130 kg/ha, phosphorus (P), and 90-160 kg/ha potassium (K), and should be based on commercial laboratory analysis.

Another option for increasing plant nutrient concentrations in the soil is the use of cover crops. These are generally leguminous plants, such as alfalfa, clover, medic, field peas, cowpeas, soybeans and other types of beans. These crops should be grown in rotating sections of the farm on an annual basis. Thus, if the farm is divided into 4 sections, one section each year will have a cover crop, the other three used for vegetable production. The cover crops are grown each summer up to the period when they are in full-flower stage. They are then cut and incorporated into the soil directly. At seeding rates of 20 kg/ha for clover, approximately 100 kg/ha of nitrogen is produced in the plants. One – half of this nitrogen is useable by vegetable crop plants the first year, and the remaining half the second year. Other benefits of cover crops are discussed in following recommendations.

#### Manure – Average Fertilizer Composition (% dry weight)

<u>Animal</u>	<u>nitrogen</u>	<u>phosphorus</u>	<u>potassium</u>
Cow	1.3	0.9	0.8
Horse	2.0	1.0	1.7
Sheep	2.0	1.4	3.5
Poultry	3.0	5.0	1.8
Swine	3.5	0.5	0.7

If using animal manures to obtain at least some of the needed soil nutrients, the process should be started several years before planting a field and should continue. This is important because of the decomposition and nutrient release rates of manures, as well as the relatively large amounts needed to provide adequate crop nutrients. This is especially true if using fresh manures. At least one growing season should be allowed after application and before planting. The total potential n-p-k from the manure is not available immediately. In cold climates, such as Mongolia, the decomposition and nutrient release process can take 2-3 years.

Example – Sheep manure (content- 2.0 % N, 1.4 % P, 3.5% K), to be used on a potato crop (fertilizer needs, Kg/Ha- 200 N, 130 P, 150 K)

Necessary Application Rate of sheep manure to supply adequate fertilizer nutrients for potatoes: 10 Tons / Ha/ year. (Assumes manure application process to the field was started several years before first crop).

One major problem with using cover crops in Mongolian vegetable farms is that herders will probably want to divert this plant material for animal fodder and not reincorporate for the benefit of the vegetable farms. A choice must be made as to providing adequate vegetable crop nutrition or simply supplementing animal ventures by basically inefficient means.

Currently unused animal by-products may be a more practical fertilizer source for some elements on the vegetable farms. The vegetable farms are currently deficient in several fertilizer nutrients

and this is severely limiting yields. Relatively low cost, readily available animal by-products such as bone meal, blood meal, hoof and horn meal, may be a more practical fertilizer source for the vegetable farms. For example:

Bone meal – 2% nitrogen, 22 % phosphorus

Dried blood meal – 13% nitrogen, 1.5% phosphorus and 0.8% potassium

Hoof and horn meal – 12% nitrogen, 2% phosphorus

Bird feathers – 15% nitrogen, 30 % phosphorus

#### Wood Ash

Although wood ash contains phosphorus (P) and potassium (K), its use is not recommended at most Mongolian vegetable farm sites. The reason is that wood ash has a very high pH. This should not be added to the already existing high soil pH fields.

#### **4) Vegetable seed varieties**

##### Vegetable “Seed” – Potato

Potato plants are started from 30-70 gram small potatoes or pieces of tuber. These “seed” potatoes should be from firm, disease-free stock. Ideally, only improved varieties should be used. In several locations farmers mentioned the lack of storage quality of some varieties currently used in Mongolia. Efforts should be made to experiment with different varieties more suited for this area. Trial varieties should include russet Burbank types, which have good storage qualities. (see table 1 below)

**Table 1. Potato yields of commonly grown varieties in irrigated trials from North Dakota , USA. – Recommended for trials in Mongolia**

Variety Color	Color	Yield T/ha
Goldrush	Russet	36 - 45
Russet Norkotah	Russet	38 - 41
Russet Burbank	Russet	40 – 40
Shepody	White <sup>1</sup>	34 - 40
Atlantic	White	41 - 44
Norchip	White	35 - 40
NorValley	White	36 - 47
Snowden	White	34 - 47
Nordonna	Red	36 - 40
Red Norland	Red	36 - 45
Red Pontiac	Red	37 - 50

##### Vegetable seed – cabbage, tomato, onion, carrot, others

Vegetable varieties should be adapted to local conditions. This includes climate and length of growing season. For example, some onion varieties mature in 90 days, some in 120 days. Considering the relatively short growing seasons, shorter maturity varieties should be selected. Farmers in several locations mentioned the progressive reduction in fruit size and quality from saved seed. In some cases, the seed used was hybrid seed. Seed saved from a hybrid tomato, for example, will generally not produce the same quality of plants in subsequent years. Since the



practice of saving seed is important to farmers, “open-pollinated” varieties should be used. These types of seeds will generally reproduce plants very similar year to year.  
Some recommended vegetable varieties for testing in Mongolia:

Cabbage- Head Start, Copenhagen Market, Drumhead, Early Jersey Wakefield, Dynamo, Parel, Primax, Arrowhead, Capricorn, Farao

Tomato- Siberian Red, New Yorker, Early Swedish, Oregon Spring, Stupice.

Onion – New York Early, Copra, Prince, Frontier, White Sweet Spanish, Blanco Duro, Superstar, Ringmaster.

Carrot – Dominator, Nantes, Chantenay, Danvers

## **5) Soil Conditioning**

### **Soil and Water pH (acidity/alkalinity)**

The optimal soil pH value for most vegetables, including onion, carrot, cabbage and melons is about 6.5 (slightly acidic). An acceptable range is 6.0 – 7.5. The exception is potato. The optimal soil pH is about 5.2. 32 of the 34 soil tests done on Gobi-Initiative - supported farms had pH values greater than 8.0. These high pH (basic or alkaline) conditions are significantly reducing nutrient availability and therefore vegetable yields. In the case of potatoes, the potential yield reduction is even greater. In addition to potato yield reduction, susceptibility to diseases such as scab is greatly enhanced by high soil pH.

### **Optimum Soil pH**

---

Tomato, Onion, Carrot, Cabbage, Melon – 6.5

Potato – 5.2

A common method of acidifying soil is with the application of sulfur (S). In order to lower farm soil pH to more acceptable levels, this method is recommended for most Mongolian herder farms. Sulfur is an eye and skin irritant, but is relatively safe to trained applicators and the environment.

Application rates necessary to correct soil pH depend on the starting alkalinity and the desired end value. Also, specific soil buffering capacities will require testing to determine exact application amounts needed. The general range necessary to change soil with a current pH of 8.0 to a pH of 6.5 is approximately 0.7 to 3 tons / ha.

It should be noted that the bio-chemical process of lowering soil pH is slow, requiring more than one year to complete. The needed sulfur should be applied partially, over an extended period of time

If chemical fertilizers are used, ammonium sulfate not only adds nitrogen to the soil but also lowers soil pH.

Gypsum, calcium sulfate, can improve soil structure and water penetration on sodic soils, i.e. soils high in sodium salts. In areas where laboratory tests have confirmed high sodium, applications of approximately 10 tons per hectare are recommended. Even when tests indicate

gypsum application is needed, increasing organic matter levels will enhance the benefit obtained from gypsum application. The fall season is generally the best time for application.

### Soil Organic Matter

Organic matter (o.m.) in soil is important for vegetable production for many reasons. One is to improve soil structure – aeration, drainage, rooting, etc. Another factor in o.m. is to increase cation exchange capacity. This is the ability of the soil to hold plant nutrients for use by crop plants. If o.m. is too low, applied fertilizers will not be held in the soil and are quickly leached out of the root zone. Based on 34 soil tests from G.I.-supported farms, organic matter % ranged from 0.1 to 8.6. Optimal o.m. levels are around 2% to 5%. More than one-half of the farms tested have o.m. levels below 2%. Although application of manure can increase o.m., as discussed earlier, this is probably not a sustainable prospect. The other preferred option is rotational planting of cover crops.

Crop Rotational Plan – One field divided into 6 sections. Move each crop planting location one place, in a clockwise direction, each year.

#### Year one

-----;			
: cabbage	?	potato	:
:	:	?	:
:	:	:	:
:-----:		:	
:	?	:	:
:	cover	:	cover
:	crop	:	crop
:-----?		:	
:	?	:	:
:	tomato	:	onion/
:	:	:	melon/
:	?	:	cuc
:-----:		:	

#### Year two

-----			
:	:	:	:
:	cover	?	cabbage
:	crop	:	:
:-----:		:	
:	:	:	:
?	tomato	:	potato
:	:	:	?
:-----:		:	
:	:	:	:
:	onion/	:	cover
?	melon/	:	crop
:	cuc	:	:
:-----?		:	

## Cover Crops for Organic Matter

In addition to providing nitrogen to soil, cover crops also add organic matter. Legume cover crops, such as those listed in the fertilization section, produce the equivalent organic matter of 10 tons / ha of manure.

## **6) Irrigation**

Vegetable crops in Mongolia have the same biological evapo-transpirations rates as any other area with equivalent temperatures and wind. Depending on size of crop, amount of ground cover, wind, temperature and species, vegetable crops in Mongolia need approximately 250,000 liters of water per hectare per week. That is equivalent to 2.5 cm, or 250 tons of water. While plants are small and temperatures are cool, the water use will be approximately 100 tons, and large mature plants in hot, windy areas may need 350 tons of water per week for peak production. An alternative to furrow or flood irrigation, called drip irrigation, is discussed in appendix 2.

## **7) Weed Management**

A major yield-limiting factor on herder farms is poor weed management. On most farms observed, weeds were significantly in competition with crops for nutrients, water and even sunlight. Although some efforts were being made to remove weeds by hand, the timing of this substantial labor input made it ineffective. By waiting to remove weeds until after they had absorbed scarce fertilizer and water away from vegetable crops and had produced seeds, another large weed problem next year is all but assured. By simply hand-pulling weeds earlier in the season and before seed production, weed populations will gradually be reduced in subsequent years and their competitive effect on current seasons crops will be minimized. This change in timing would also not require any additional labor.

One more benefit of cover crops, (see fertilizer and soil organic matter sections) is in weed management. Sections of farms planted to cover crops will have substantially fewer weed problems simply because of the densely planted legumes' ability to out-compete weeds for water, fertilizer and sunlight. Major weeds noted on farms included – Pigweed- *Amaranthus* sp., lambsquarter- *Chenopodium* sp., morning glory- *Ipomea* sp., nightshade- *Solanum* sp., ragweed- *Ambrosia* sp., dock – *Rumex* sp., Russian thistle – *Salsola* sp. and puncture vine- *Tribulus* sp.

Chemical herbicides can be used in some situations for effective weed control. However, there is no one herbicide that will control all weeds and can safely be used around all crops. Also, there appears to be little training in the proper use of pesticides in general. Observations made on the current use of the insecticide Decis show untrained people applying the chemical in an unsafe and usually ineffective manner. Therefore, the use of herbicides is not recommended until a system of training is developed. Availability of herbicides is another issue that would have to be addressed.

## **8) Insect Pest Management**

The most serious insect pests observed were various species of lepidopterous larvae (butterfly and moth) feeding on cabbage. On some farms, Decis (deltamethrin) was being used. As the product label was not in the Mongolian language, or English, recommended application rates were apparently not known. Also, several incidents of very unsafe application practices were observed with this product. Without full label information in the Mongolian language and

complete training on use, it is recommended to discontinue use of this material. Also, in almost all cases, for a variety of reasons including high water pH inactivating the insecticide, effective insect control on cabbage was not being achieved.

A safer alternative for control of many caterpillars is a biological insecticide, *Bacillus thuringiensis*. It is sold as Dipel, Thuricide, and other names. It is legal to use in Mongolia according to the Department of Agriculture. It is recommended that insect control trials be done to determine the effectiveness on cabbage pests under local conditions. In at least one aimag – Uvurhangai- serious grasshopper populations were noted. With proper timing, this pest can also be managed with a safe biological insecticide- *Nosema locustae*.

## **9) Farm Size**

For perhaps several reasons, including a colhoz model, there seems to be an encouragement of herder farmers to want large parcels of land in their farms. In many cases, there is an inadequate labor commitment to the farm, and production per area is relatively low. Large areas of current farms are often improperly weeded or not planted. Plant spacing is often less than efficient. Manure or any other fertilizer or organic matter application is definitely inadequate in most situations. All these factors lead to low yields per area, and per unit labor time.

A more efficient use of land, manure, seed, water and labor would be to encourage smaller, high intensity growing practices. High yield per meter square should be the goal, not how many hectares one has in a farm.

## **10) Tunnels**

Existing plastic-covered vegetable “greenhouses” range in size from a few square meters to over 100 meters square. In most cases, these are low, 1.0 – 1.5 m high, wood or metal frames with a single layer of polyethylene covering. The internationally-used term for these structures is “tunnels”. No daytime ventilation is provided. As a result, carbon dioxide depletion is the limiting factor in production. Recommended tunnel side and roof vents should total 20% of floor area. A tunnel with dimensions of 6 meters by 12 meters, 72 meters square, should have 14 meters square of vents. This relatively inexpensive addition to current tunnels alone will dramatically increase yields. As no heating systems are installed, these structure can only be used from late spring to early fall.

With expected market prices very high in winter months for such short-storage vegetables as tomatoes and cucumbers, a pilot commercial quality greenhouse is recommended. This should be a double layer, air separated polyethylene or polycarbonate structure. Winter heating could be supplied by coal, dried manure, wood, electric heaters, natural gas, or recycled waste heat from power plants. Ventilation could be passively designed and air circulation fans could be electric or solar electric powered. In addition to the higher winter vegetable prices available, an efficient, 0.5 ha greenhouse can produce more vegetables than 2 hectares of field grown vegetables. As an example, in many parts of the world, including Central Asia, greenhouse tomato and cucumber yields can average 14 kg per plant. These yields are possible in Mongolia, even in winter months, if adequate heating can be provided.

## **SUMMARY**

The current production limitations on Mongolia vegetable farms are all resolvable. Most are, in fact, easily solved. For example, the one-time importation of high quality, locally adaptable, open-pollinated vegetable seed will do much to improve yields to profitable levels. A few low-toxicity, relatively low cost chemicals will also dramatically change production prospects. These include pH reducing sulfur, biological cabbage “worm” and grasshopper control products and nitrogen fertilizer.

On most farms observed, adequate irrigation water was available in both quantity and quality. In situations of more limited water resources, simple drip irrigation systems are recommended. Drip tape, emitters, fittings and filters are already available in Ulaan Bataar, and are in fact being used in Khovd aimag.(personal communication with farmers and University specialists in the region) .

Continuing soil improvement programs will be critical to the longer term sustainability of these farms. Organic matter, nitrogen and other fertilizer levels must be increased to improve yields and profit. The soil pH levels in most locations should be decreased and effective weed management instigated in all areas. To accomplish these improvements, vegetable production training will be essential for the longer term economic success of this project.

## Appendix 1

### Limitations to Vegetable Production based on Field Observations and Discussions

1. Commercial fertilizer availability in country.
2. Information on characteristics of seed used, including length of growing period. e.g. Planting 120 day maturity melon seed in mid-July (not harvestable until mid-November, well past first frost date)
3. Vegetable seed most suitable for the area
  - Vegetable seed that is available sometimes includes hybrid varieties, which are not suitable for producing seed to be saved and used in following years.
  - In many cases, potato “seed” comes from general market potatoes and not selected seed potato stock.
4. Most vegetable farms are too large in size for available labor force.
  - Inefficient use of land currently in farm production. Large sections are empty, many ‘skips’ in rows.
5. Organic matter levels in soils
6. Effective weed management
  - On most farms, weed removal is not done until after the weeds have already released their seeds and, the pulled weeds were not promptly removed from the field. Also, on several farms, weeds known to be toxic to livestock are being removed from the farm and fed to livestock. Observed toxic weeds include- pigweed- *Amaranthus* sp. , lambsquarter – *Chenopodium* sp. , nightshade- *Solanum* sp. , and dock – *Rumex* sp. .
7. Effective insect pest management, especially on cabbage
8. Relatively high soil and water pH values in most areas
9. Crop rotation – e.g. potatoes planted in same plot year after year.
10. In a few cases, farmers were attempting to irrigate fields by hand from wells.
11. Marketing plans based on optimistically high yields and process to be paid by consumers. World Bank 2003 figures for potato yields in Mongolia = 7.6 T / ha. Marketing plan yield estimates – 10 to 14 T / ha.

## **APPENDIX 2**

### **DRIP IRRIGATION MANUAL FOR VEGETABLE CROPS IN MONGOLIA**

The primary advantages of drip irrigation for vegetables include:

1. Relatively constant soil moisture content
2. Ability to irrigate only rooting area, resulting in water conservation and reduced weed populations.
3. Reduced evaporation, ability to match application rates to infiltration rates, reduction of run off.
4. Reduction of disease problems versus overhead sprinklers

Typical vegetable spacing for emitters is 30 cm. apart along the line. For tomatoes, a single emitter is placed near each plant. For root crops such as carrots, onions, etc, two plants per emitter are planted. In intensive growing systems, parallel emitter lines are 40 cm apart. Conventional line spacing would be 60 cm. The line pipe diameter is 1.25 cm.

#### **Planning**

The available water supply will determine the number of plants that can be watered at any one time. The flow rate of the water supply should be determined by collecting the maximum output per minute. Usable water is 75% of maximum and determines liters per minute.

#### **Emitter Placement**

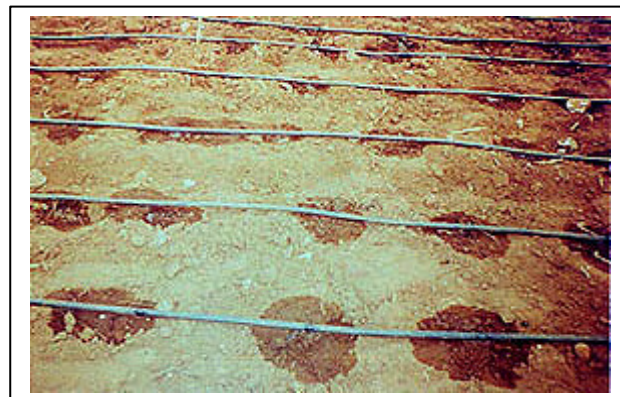
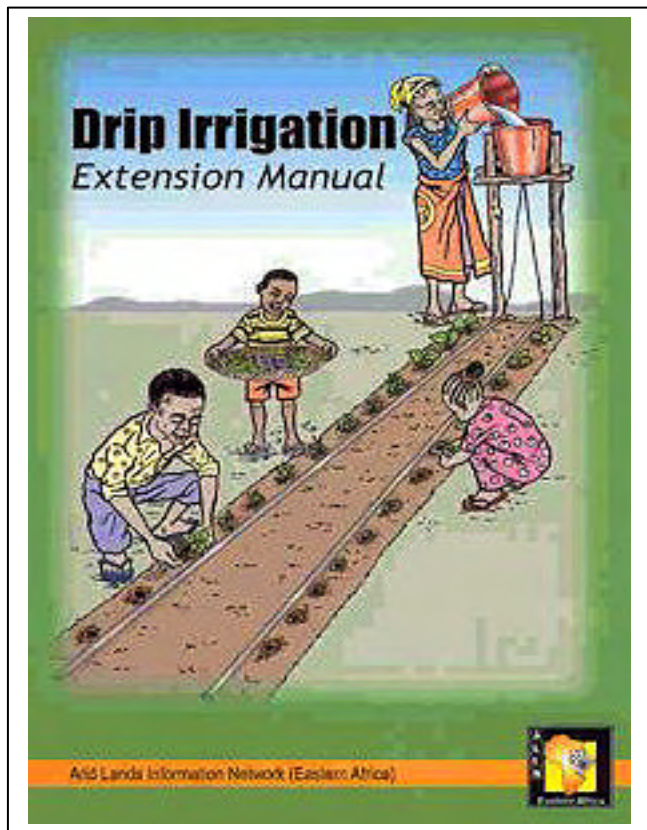
The most important factors in emitter placement are the crop rooting depth and soil type. Shallow roots – carrots, onions- require closer emitter placement than deeper rooted crops such as tomato and melon. In coarse soil- gravel, sand – water moves downward readily and requires closer spacing than fine – clay- soil. Typical emitter flow rates are 1.9 liter, 3.8 liter, and 7.6 liter per hour. Shallow rooted vegetables should have 1.9 – 3.8 liters per hour emitters, while deep rooted crops should use 3.8 – 7.6 lph emitters.

#### **Tubing**

The tubing size is 1.25 cm diameter and can be used for flow rates up to 1200 liters per hour. Downhill flows add 0.4 psi per vertical foot. For gravity feed drip systems more than 3 meters in elevation, pressure regulators may be needed. Polyethylene tubing is the least expensive and has a life of approximately 20 years. PVC can be used as an alternative. Filters should be used at the water source and before entering drip lines.

#### **Watering Schedules**

Typical vegetable water schedules are 0.5 – 1.5 hours, every 2 days. Peak water use for vegetables in warm climates is 2.5 – 5.0 cm per week. 2.5 cm of water is equal to 250 liters / 10 m<sup>2</sup> (250,000 liters per hectare). Rainfall amounts should be subtracted from drip water applications.





## GROWING CABBAGE MANUAL - BRASSICA OLERACEA

Adapted from Oregon State University , “Cabbage”, Aug. 2004 - Gary W. Hickman, Consultant

VARIETIES (approximately 75 days for early varieties, 90 days for mid-season, to over 120 days for late large-headed varieties).

Excellent cabbage varieties are available that are resistant to heat, cold, and a number of important diseases and physiological disorders. Choose test varieties carefully. The following is only a representative listing.

### Fresh Market

**Green** Early - Heads Up, Stonehead. For Trial: Charmant, Cheers, Dynamo, Earliana, Golden Acre, Green Cup, Grenadier, Rocket.

Mid-season - Bravo, Market Prize, Market Topper, Protector, Quisto, Tastie. For trial: Blue Pack, Jump Start; K-K cross and O-S Cross (heat tolerant, large).

Late - Bartolo, Danish Ballhead strains. For trial: Excel, S-D Cross, Winter Star, Zerlina

Other green cabbage for trial: Columbia, Delos, Farao, Gideon, Izako, Pennant, Parel, Supreme Vantage, Rocket, Royal.

Savoy Cabbage: Savoy Ace. For trial: Clarissa, Wirosa.

**Red:** Red Head, Ruby, Ruby Ball, Ruby Perfection. For Trial: Cardinal, Primero, Red Jewel, Red Rookie, Rona, Super Red 80.

### Processing Cabbage

The following have been grown successfully:

**Green:** Bravo, Carlton, Danish Ballhead. For trial: King Kole, Late Flat Dutch, Roundup, Superette, Titan 90, Atria (very late), Ergon (very late), Krautking (late, large), Krautman, Krautpacker (mid-season), Marvellon (early), Orbit (late), Rodolfo (mid-season), Sagitta (late).

**Red:** Ruby, Ruby Ball, Ruby Perfection. For Trial: Cardinal, Red Head.

### Important Considerations for Field Selection

Before planting this Crucifer crop, consider the following important factors which affect a number of diseases such as club root and *Sclerotinia*:

1. No crucifer crop, or related weed has been present in the field for at least 2 years, 4 years preferable. Crucifer crops include cabbage, cauliflower, broccoli, kale, kohlrabi, Brussels sprouts, Chinese cabbage, all mustards, turnips, rutabagas, radishes etc. Cruciferous weeds include wild radish, shepherds purse, wild mustards etc. Also, crucifer plant waste should not have been dumped on these fields.

### SEED AND SEED-BED TREATMENTS

Use treated seed to protect against several serious seed-borne diseases. Hot water seed treatment is used

under certain conditions (especially for transplant production). This treatment is very specific (50 C exactly, for 25 to 30 minutes; the wet seed must then be quickly cooled and dried).

## **TRANSPLANT PRODUCTION**

### **Seedbeds for Transplants:**

When seedlings are to be grown in a seed-bed for production of transplants, choose a site where cole crops have not been grown before.

Always use certified or hot water treated seed for transplant production. Seed in a greenhouse for an early crop, in a cold frame for a less early crop, and in outdoor seedbeds when the weather is warm enough for germination and growth (above 10 C). In each case seed 5-6 weeks ahead of when the plants are wanted for transplanting.

200 – 350 gm of high quality, sized and density graded seed will provide enough transplants to plant 1 hectare.

## **SOIL**

Cabbage may be grown on a variety of soils but it does best on a well- drained, loam soil well supplied with organic matter. Sandy loams are preferred for early crops. Adjust soil pH to 6.5 - 7.0 for maximum yields.

Cabbage is often referred to as a cole crop. Cabbage will tolerate a wide range of environmental conditions but thrives in cooler temperatures. Cabbage can tolerate hard frosts, but severe freezes can be damaging. Cabbage flavor improves with cooler temperatures because plant cells are working to convert starches to sugars to protect the plant against the cold. The result is a sweet, fresh taste that surpasses that of store-bought greens. Cabbage planting dates should be planned so that harvest dates occur in cool weather.

### **Spacing**

Cabbages produce large leafy plants. Space cabbage plants at 30 – 45 cm within the row and space rows between 45 cm and 85 cm apart.

### **Direct Seeding**

A well-prepared seedbed with adequate moisture is a must for direct seeded cabbage. Sow cabbage seeds 1.25 cm deep. Gently press the soil after planting to ensure the seed is in contact with it. Thin to one seedling within each 30 cm.

### **Germination**

These seeds germinate best in soils around 24°C. Germination will take 4-14 days.

### **Transplanting Into the Garden**

Transplant cabbage seedlings at 4-6 weeks.

### **Watering**

An even moisture supply is needed for transplants to become established and to produce good yields. Do not over-watering transplants after setting them out.

## **Harvesting**

Heads should be harvested when firm and before they split or burst.

## **Post-Harvest Handling**

Cabbage should be handled carefully from field to storage, and only solid heads with no yellowing, decay, or mechanical injuries should be stored. Before the heads are stored, all loose leaves should be trimmed away; only three to six tight wrapper leaves should be left on the head. Loose leaves interfere with ventilation between heads, and ventilation is essential for successful storage.

## **Storage**

Store cabbage at 0°C and a relative humidity of 98% to 100%. A large percentage of the late crop of cabbage is stored and sold during the winter and early spring, or until the new crop from the southern states appears on the market. If stored under proper conditions late cabbage should keep for 5 to 6 months. The longest keeping cultivars belong to the Danish class. Root cellars or other limited control storage should be insulated sufficiently to prevent freezing of the cabbage. Heaters are sometimes needed to prevent freezing of cabbage in common storage during severe cold weather. Cabbage wilts quickly if held under too dry storage conditions. Cabbage should not be stored with fruits emitting ethylene. The most common decays found in stored cabbage are watery soft rot, bacterial soft rot, gray mold rot, alternaria leaf spot, and black leaf speck.

## **Growing Irrigated Potatoes Manual**

(adapted for Mongolia from - North Dakota State University, AE-1040, March 1999)  
Gary W. Hickman, Consultant

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Planting Season Varieties Production and Cultivation Practices Fertilization Pest Control Irrigation  
Management Harvest Considerations

### **Planting Season**

The planting season for potatoes generally extends from about April 1 to June 1. In general, late varieties used for processing and early maturing varieties for the fresh market should be planted first. Early maturing table varieties destined for storage may be planted in late May or early June.

### ***Varieties***

Potato yield response to irrigation will vary depending on whether short season or long season varieties are wanted. In general, the full season varieties will show the greatest response to irrigation. Most varieties that have performed well under dryland conditions also perform well under irrigation. Market demand will generally dictate the selection of a variety or varieties to grow.

There are three types of potatoes grown under irrigation: smooth red skinned varieties (used primarily for the fresh market), smooth white skinned varieties (used in processing; chips and dehydrated products), and russet skinned varieties (used for the fresh market, french fries and dehydrated products). Within each of these types there are early and late maturing varieties.

A desirable characteristic for potatoes used in processing is the percentage of total solids (mostly starch). This trait is variety-dependent and typically ranges from 17% to 23%. The most important varieties for production of french fries are Russet Burbank, which has good yields, high solids, and stores well, and Shepody, which can be harvested earlier with acceptable yield and solids content. Another important processing trait is the percentage of reducing sugars that influence browning during the fry process. NorValley and Snowden are somewhat resistant to the increase in reducing sugars that comes with storage at colder temperatures.

**Table 1. Potato yields of commonly grown varieties in irrigated trials from North Dakota , USA.**

Variety Color	Color	Yield T/ha
Goldrush	Russet	36 - 45
Russet Norkotah	Russet	38 - 41
Russet Burbank	Russet	40 - 40
Shepody	White <sup>1</sup>	34 - 40
Atlantic	White	41 - 44
Norchip	White	35 - 40
NorValley	White	36 - 47
Snowden	White	34 - 47
Nordonna	Red	36 - 40
Red Norland	Red	36 - 45
Red Pontiac	Red	37 - 50

With a high percentage of total solids, good storage characteristics, and appropriate shape, the Russet Burbank variety is the most popular variety grown under irrigation. Currently, it is the industry standard for french fry potatoes. However, other varieties were higher yielding on irrigated potato trials.

### **Production and Cultivation Practices**

Seed bed preparation before planting will be determined by the previous crop. The soil should be loose at planting with a minimum of preplant tillage.

#### **Seeding Rate and Depth**

The amount of seed needed for planting depends on variety, distance between rows, the spacing within rows and the size of the seed pieces (Table 2). Seed pieces should be cut from tubers no larger than 280 grams for round varieties and 340 grams for Russet Burbank. Seed pieces cut from smaller tubers are more uniform in size, give better plant stands and usually more tubers per hill. Seed pieces should be between 42 gm. and 70 gm.

A healthy 30 - 57 gram seed piece is considered best to establish a vigorous plant. Plants from seed pieces smaller than 30 grams are generally slower to emerge and have less vigor. Small seed pieces are also more likely to decay before the plant becomes established. Seed pieces cut larger than 57 grams result in higher seed costs with little potential benefit.

Generally the center of the seed piece should be planted 5 – 10 cm below field level and covered with 5 – 8 cm of soil. Shallow covering usually results in quicker emergence, less seed decay, less blackleg and less rhizoctonia attacking the sprouts. However, the best seed depth will vary somewhat with soil moisture and temperature. Moist soil with temperatures averaging from 50 to 60 °F favor wound healing

in the soil with minimum seed decay. Very deep planting may result in poor wound healing and lead to seed decay, particularly if heavy rains follow planting.

## **Growth Stages**

The growth, development and **water requirements** of the potato plant can be divided into the following four stages:

**VEGETATIVE.** After planting, this stage of growth begins when the eyes break dormancy and produce sprouts. This stage has duration of 15 to 30 days and ends with tuber initiation. Stored soil moisture and spring rains are usually sufficient during this period to provide adequate moisture for proper development. However, soil moisture monitoring should be started soon after emergence. For disease control, irrigation should be avoided between planting and emergence. If the soil is dry prior to planting, irrigate before planting rather than after.

**TUBER INITIATION.** This stage of growth begins when tubers develop at the stolon tips. Approximate duration of this stage is 10 to 14 days. Stored soil and spring moisture supplies are usually adequate during this period however; soil moisture levels should be watched closely because water stress during this period can reduce the number of tubers produced per plant.

**TUBER BULKING.** A constant rate of increase in tuber size and weight occurs during this stage, unless a growth limiting factor is present. This stage can last from 60 to over 90 days, depending on the length of the growing season and presence of pathogens. **Tuber size and quality is closely related to moisture supply in this period.** Research has shown that the total yield of potatoes is most sensitive to water stress during mid-bulking. Mid-bulking occurs three to six weeks after tuber initiation, however, water stress any time during this period will have an effect on the total yield. Tuber growth is retarded by moisture stress and does not resume uniformly when moisture again becomes available. New growth and enlargement will take place at the top end while the other portions of the tuber remain stunted. Thus, especially in some long tuber varieties, constricted areas develop that are related to the stage of tuber growth at the time the moisture stress occurred. Other deficiencies in quality such as growth cracks and knobiness are also related to moisture stress followed by periods of adequate or surplus moisture.

**MATURATION.** This stage of growth begins with canopy senescence. Older leaves gradually turn brown and die. This condition spreads throughout the vines and leaves eventually resulting in canopy loss. Tuber growth rates are lower than during tuber bulking. Potato plants require less water for tuber bulking during this stage because of reduced transpiration from the dying leaves.

## **Weed Control**

Weeds reduce potato yields by competing for water, nutrients and light. Also, certain weed species can cause difficulty in harvesting, release toxins that inhibit crop growth, and harbor insects, diseases or nematodes that may attack potatoes.

An effective weed control program includes environmentally sound cultural, mechanical and chemical weed control methods. Crop rotations, cultivation and the use of different herbicides help avoid the buildup of resistant weed species. Certain herbicide residues from previous years can damage potatoes. Use a planned weed control program and avoid herbicides that will injure or reduce growth of subsequent crops. Always read the pesticide label for information on crop rotations and intervals.

Tillage and herbicides are the two primary means of controlling weeds in potatoes. Cultivators, harrows and rotary hoes are commonly used. The first tillage operation after planting is usually a "blind" cultivation or harrowing before the crop emerges. The number of tillage operations will vary, but three cultivations and two harrowing operations are common.

After emergence, inter-row cultivation is used to control weeds and to form a ridge or hill over the seed-piece and developing tubers. Besides controlling weeds, the ridge or hill helps protect tubers from sunburn (tuber greening), late season frosts, excessive rainfall or irrigation, and reduces the amount of soil to be moved at harvest. One danger of excessive cultivation and deep cultivation of potatoes is root pruning. Potatoes are a shallow rooted crop, with roots growing laterally 25 – 45 cm and downward to a maximum depth of one meter. Root pruning may be a problem with late cultivations, reducing the overall growth potential of the potato plant.

#### Fertilization

A potato crop makes a large demand on the soil for nutrients. The amount a 30 T / ha crop of potatoes will utilize depends on potato variety, climate, soils, and irrigation system management. The average nutrient content is:

Nitrogen – 90 kg.

Phosphorus ( $P_2O_5$ ) – 27 kg

Potassium ( $K_2O$ ) -- 136 kg.

One-third to one-half of these nutrients are found in the vines and returned to the soil. The remainder is removed with the harvested tubers and must be replaced.

#### Soil Testing

The best way to determine the amount of fertilizer to apply is by a soil test. Fields should be tested every year for nitrate-nitrogen and every two to four years for phosphorus and potassium.

With a good crop rotation, a certain amount of residual nitrogen will be carried over for use by potatoes. Potatoes following any legume such as soybeans, alfalfa, dry beans, or clover will benefit. Also, if sugarbeet leaves are green at harvest, some N would also be expected to be released the following year. Potatoes following corn or small grains may not inherit much residual nitrogen. Soil sampling before planting will indicate how much residual nitrogen is left in the soil but may not reflect mineralization of residues during the year.

#### Fertilizer Application

Fertilizer applied at planting should not come in direct contact with the seed pieces. The recommended method is to place fertilizer in two bands, each band one cm. to the side and one cm. below the seed pieces. Broadcasting is also acceptable. Application of all the required nitrogen in a single preplant operation is not a recommended practice. Fertilizing to achieve maximum utilization of nitrogen in potatoes on irrigated sandy ground requires split applications. A rule of thumb on medium to heavy soils would be one-half the needed nitrogen applied preplant and the remaining nitrogen needs applied as urea or 28% liquid solution at hilling. On sandy soils consider applying one-third to one-half at planting followed by one-fourth to one-third at emergence and the remainder at hilling.

Studies on irrigated potatoes show little to no advantage to applying more than 200 kg /ha of total nitrogen to reach optimum yields. The quality of the potato for storage also declines if excessive nitrogen is used.

All fertilizer products can be used in potato production. Dry product blends that match soil test needs and are broadcast applied prior to seedbed preparation offer management and application convenience. Also, during the hilling operation, the fertilizer is moved to the row with the soil, which concentrates nutrients in the active root growth zone. Equal management convenience can be obtained with a variety of fertilizer

products that are sidedress applied in bands that the root system intercepts early in the vegetative growth stage.

## Disease

High quality, healthy seed is essential to production of a good potato crop. Use only certified seed. Sanitize knives between seed lots and prior to cutting. Plant seed immediately after cutting. If possible, avoid irrigation to obtain crop emergence. Early irrigation can lead to early infection from *Verticillium* and to problems with soft rot and blackleg.

Potatoes should not be grown more often than every three years on the same piece of land. This reduces carryover of diseases such as early blight, silver scurf, late blight, and *Verticillium* wilt. Potatoes should be monitored beginning in late June for both early blight and late blight. Early blight is common on irrigated potatoes. Fungicide applications should begin when early blight is beginning to show up on the lower leaves of the plants.

Notes relative to observed practices on some Mongolian farms:

Removal of potato flowers – There is no reason to remove the flowers from potatoes. There is no improvement in tuber yields with this practice. Removing flowers actually reduces yields by taking labor away from such important tasks as removing weeds.

Removal of green potato leaves – The only way a potato tuber can get photosynthate (sugars and starches) is from the leaves. Any leaf removed will only serve to reduce yields.

## **APPENDIX 5**

### **UNDERGROUND CELLAR MANUAL FOR VEGETABLE STORAGE IN MONGOLIA GARY W. HICKMAN, CONSULTANT**

This report is based on field observations of vegetable farms in Mongolia in July and August of 2005.

New vegetable production ventures by herder families in Mongolia have resulted in the production of surplus product. The primary crops grown, that need storage cellars, are potato and cabbage. Other crops include onions and carrots. Good cellar designs satisfy three conditions: coolness, darkness and proper humidity.

Optimum storage temperatures and humidity levels for specific crops are given in the general recommendations section of this manual. In summary, most potatoes are best stored at temperatures of 4 to 10 C. with a humidity level of 90%. This is especially true for the long-storing varieties such as russet Burbank. Optimal cabbage and carrot temperatures are 0 C and 96% humidity. Onions are best stored at temperatures of 0 C and 70% humidity.

Given the local conditions in Mongolia during winter months, the challenge will be to keep storage conditions from going below freezing.

Based on interviews with farmers and local consultants, the soil freezes down to depths of 0.5 – 2.5 meters during the winter. The maximum expected soil freeze depth will determine the cellar parameters at each specific location. The top of the actual vegetable storage should be below the expected soil freeze depth.

Several good cellar designs have already been constructed at various farms in Mongolia.

These are basically pit rooms dug into the ground, covered with a wooden roof, and the removed soil placed on top of the roof. Exact dimensions are not important, other than depth.

For a 20 ton storage structure, the following dimensions have been used in Mongolia:

Depth- 4 meters, width- 5 meters. Top soil over wooden roof – 2 meters deep.

Wooden shelves should be provided to keep stored crops off the ground. If soil water tables are high, drainage out from the cellar should be provided. This can be accomplished by installing perforated pipe around the inside of the cellar and sloping is away from the inside.

For humidity control, closable vents should be installed from the cellar ceiling to the outside. These vents should also be screened to prevent rodent entry.

To help reduce disease incidence in the cellar, air movement should be considered. Small solar electric powered fans could be used. Also, even a small amount of heat supplied to well-insulated cellars during very cold periods may help keep temperatures above freezing. This could be accomplished with solar electric (or wind electric) infra-red heat lamps. Ordinary white light bulbs should not be used with stored potatoes as this would promote “greening”.

Cellar doors and roof should be insulated to restrict cold entry. Simple styrofoam sheets can be used.

An excellent leaflet from Alaska, with winter conditions similar to Mongolia, is below.



## **UNIVERSITY OF ALASKA, FAIRBANKS, COOPERATIVE EXTENSION SERVICE VEGETABLE STORAGE IN ROOT CELLARS**

**by Michele Hébert  
Land Resources Agent  
HGA-00331**

In Alaska, cold winter temperatures and cold soils all year long, make root cellars a good method for storing vegetables. Root cellars offer gardeners a method for storing produce through the winter or for holding produce until there is time for canning and freezing. Consumers can also use root cellars to store produce bought in bulk from the farmers market or grocery. High quality, locally-grown vegetables can be available from the root cellar throughout the winter.

Stored fruits and vegetables are living organisms and to keep the quality and nutritional value high, certain storage conditions should be met. The best conditions for each crop will vary, but the important requirements include temperature, moisture, and ventilation. To have the best success using cold storage, select late-maturing varieties of vegetables that have been allowed to grow late into the fall and fully mature.

### **Temperature**

During the day, plants make food through photosynthesis. At night or during storage, plants respire or use the stored food to survive and keep alive. To keep produce at the highest quality, it is important to slow down the growth and respiration with cool temperatures. Respiration reduces quality and speeds up with warmer temperatures. The optimum storage temperature for most vegetables is between 0° and 4.4°C. This temperature can be maintained by a combination of utilizing insulation on walls and ceilings, thermostats, and a heat source when needed. An adequate heat source can sometimes be a little as a 100 watt light bulb placed near the floor. Keep in mind that heat rises and warmer temperature will be found at the top of the root cellar. Thermometers can be positioned throughout the cellar to monitor temperatures.

### **Humidity**

High humidity (between 80 to 95 percent relative humidity) keeps vegetables from drying out. The exception to this rule is with cucurbits (squash family) and onions—vegetables that produce a thick wall. These vegetables prefer dry storage conditions and tend to mold when the moisture is high. The easiest way to keep the moisture high is to have a dirt floor which helps the root cellar keep constant moisture during the winter. If the floor is concrete or wood it may be necessary to place several pans of water on the floor. Vegetables are 90% water. The fuller the root cellar the higher the humidity. That is why a small, full root cellar will work better than a larger one.

### **Ventilation**

Ventilation is used to help control the temperature and humidity. Excess moisture that encourages mold can be exhausted and the room aired out when not in use. Be sure the ventilation system is screened to keep rodents out.

### **Harvest and storage**

Choose to grow vegetable varieties that are late maturing or have good storing qualities.

Harvest as late in the season as possible before a killing or damaging frost. Vegetables should be harvested in the morning after the dew has time to dry but before the afternoon heats up the vegetables. Remove the field heat by cooling in a cold place. Produce can be grouped according to storage requirements into four groups; cold and very moist, cold and moist, cool and dry, and warm and dry. Most vegetables need a cold and very moist storage condition because of thin skin or leaves. Thin-skin produce including beets, kohlrabi, turnips, carrots, parsnips, radishes, and cucumbers are harvested leaving a 1/2 inch stem and stored to retain moisture. This can be done with packing material or perforated plastic bags. Layer vegetables in packing materials such as moist sawdust, sand, and peat moss. Leafy vegetables such as celery, Chinese cabbage, endive, kale, and cauliflower should be lifted out of the garden with roots attached and replanted in moist

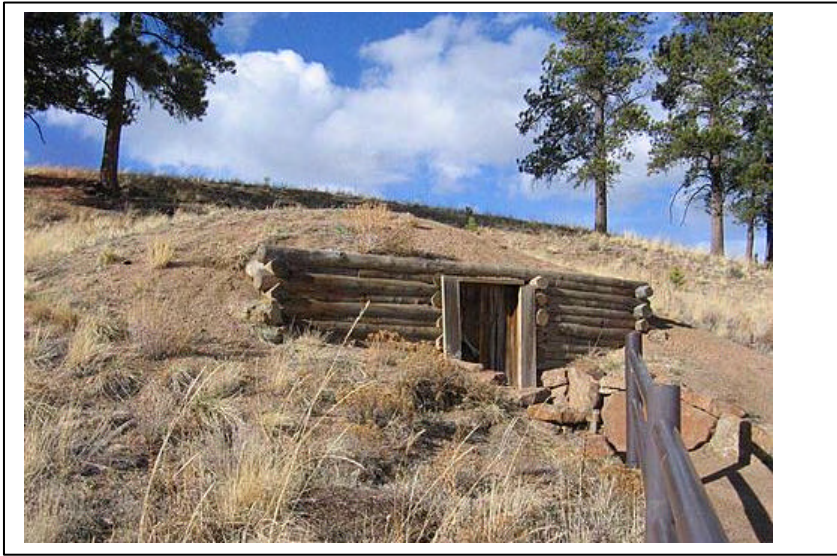
packing material. Vegetables with strong odors such as cabbage and turnips are best when individually wrapped in newspaper to prevent drying out and reducing smells.

Potatoes and tomatoes need a cold, moist storage condition. Potatoes need to be cured in a warm environment before cold storage. Harvest potatoes late in the season and store in the dark at a warm temperature for 7 to 10 days to allow the potato to dry and develop a thick skin. Then potatoes should be moved to a cold, dark area. If potatoes are stored in crates or boxes together they will share moisture and keep each other from shriveling. Do not store potatoes above 4.4°C or they will begin to sprout. Tomatoes are harvested leaving a short stem attached. Place tomatoes one layer deep in a shallow box and cover with newspaper to keep them from drying out.

Onions, like potatoes, are cured for several weeks after harvest. This allows the skin to become papery and roots to shrivel. Onions are best stored in a cool dry location with good air circulation. Onions are often braided or put in a mesh bag and hung from the ceiling of the root cellar. Winter squash and pumpkins are best stored in a dry warm spot such as the corner of a room indoors. Cut as late as possible before a frost, leaving a 5 cm long stem. The more mature, the thicker the skin and more resistant to decay and drying out the vegetables will be. If stored in a moist location, squash will quickly mold.

#### Building a root cellar

A root cellar should be cold, dark, and damp and be in a convenient location. It is easier to control temperature and humidity in a small cellar. Most families can get by with an area 1.2 m x 1.8 meter in size. The most convenient locations may be a walled off part of a basement or garage area containing a window for ventilation. A common location in rural Alaska is in the floor of the kitchen. With an inside installation be sure to put a vapor barrier towards the inside of the root cellar protecting the rest of the house from excess moisture and rot. In both attached and separate structures select wood designed for direct burial for the walls and floor. Check with supplier to be sure that the wood treatment is not toxic in this application. Uninsulated masonry walls will conduct the cool ground temperature into your root cellar and are very durable. Water drainage is important for keeping out surface water in the spring and during summer rains. Insulate above-ground walls to protect from cold temperatures in winter and warm temperatures in summer. Be aware that seasonal frost can extend over 1.2 meters deep seasonally into the soil. Keep this in mind being sure to have the insulation extend below the frost line.





## **Annex 5:**

### **Example 43: Enabling Remote Rural Herders to Diversify their Economic Activities Mercy Corps and PACT in Mongolia**

With funding from USAID, Mercy Corps and PACT are assisting herder groups in rural Mongolia to transform their traditional livelihoods into commercial enterprises, while also strengthening other existing small businesses. Mongolia is the most sparsely populated country in the world. In the Gobi region where the program operates, population densities range from 0.2-0.6 people per square km. The program assists herder groups and other rural businesses to access business consulting, training and technical assistance. It provides loan guarantees to help small producers access loans from banks. It links businesses with potential trading partners. And, it increases access to business and market information through media – radio, TV and SMS. During the first five year phase of the program, which concluded in January 2004, 300 new businesses were created through training for more than 2,500 “would-be-entrepreneurs,” and 250 herder groups, comprising 10,000 individual were formed. Consulting services enabled businesses to increase their productivity and profitability. The introduction of a herder-managed breeding program resulted in a 100% increase in the supply of “elite” breeding animals. Trade fairs and exhibitions assisted herder to sell their production and to establish valuable contacts. In the first year of the program’s second phase, which ended in January 2005, 100 herder groups and rural businesses generated a record \$650,000 in new sales.

The program is experimenting with a phased approach to developing business service markets and laying the groundwork for the commercial provision of services upon the program’s completion. Program staff provide basic business planning services to herder groups at no cost. For these herder groups, the planning focuses on improving and expanding current production or services and/or diversifying into new activities beyond selling raw wool and cashmere. Mercy Corps hopes that the staff will remain in their respective areas after the program ends, continuing to offer these business consulting services for a fee. For the more advanced and ongoing training and technical assistance needs, herder groups and other rural businesses are linked with local service providers on a cost-sharing basis. To build the capacity of these service providers, Mercy Corps engages “mentors”, private sector providers or staff from recognized universities and research institutions, who can offer local providers additional technical knowledge and help with training and technical assistance delivery skills. As the rural businesses begin paying for the consultancies offered by this growing cadre of local providers, the provision of such services is starting to operate on a more commercially-sustainable basis.

"Market Watch", a regional and national commodity price monitoring service, is one of the program’s most successful initiatives. By providing herders with prices on a timely basis, it has enabled them to market their products at the highest possible price. Prices and price trends are provided through SMS, radio, a monthly magazine and TV as part of a larger business information dissemination effort that also helps target audiences to apply the information appropriately. Although not yet covering its costs, the shift into more popular and less expensive forms of media, with better access and advertising revenue opportunities, is enabling the “Market Watch” producers to move towards greater financial viability.

Mercy Corps 2005c, Mercy Corps 2005h

For more information, visit the Mercy Corps/Mongolia website at [www.mercycorps.org.mn](http://www.mercycorps.org.mn) or email Tracy Gerstle at [tgerstle@mercycorpsdc.org](mailto:tgerstle@mercycorpsdc.org).

## **Annex 6:**

### **Rural Business News #43**

#### **Herders' Tip**

##### ***FAQ - Summertime Rangeland Management***

By G.Odgarav

In this RBN edition, our traditional Herders' Tip is again getting in touch with pasture experts on summertime rangeland management. RBN interviews T.Altanzul, a pasture expert of the Sustainable Grassland Management project for answers commonly asked by the herders. We started the interview by discussing different items regarding the rangeland and its deterioration. Having agreed that rangeland degradation is heavily influenced by the human factor, we started Q and A systematically to feed the readers with information regarding summertime rangeland management.

*What is summertime rangeland management?*

Rangeland management is a scientific approach that meets the criteria of long-term animal productivity and plant structure on rangeland. Rangeland management should be handled by soum governors, public servants and herders. A herder is a rangeland manager. Rangeland management in the summer involves rotating pastures in appropriate periods and using them on schedule so that the rotational cycle allows the different plots of rangeland to restore while being on rest.

*How do herders should handle rangeland management?*

During the plant growth period, pasture should be freed from grazing or their use rotated. When a plant goes through seven development phases, the first five of those phases occurs during the summer. Therefore, special care is important in summer rangeland management. Put simply, if rangeland management is undertaken well in the summer during core development phases, the pastureland is not likely to deteriorate. In order to prevent deterioration, focus on using the pastureland on schedule by rotating and resting.

*What do herders have to consider when rotating pastureland?*

Herders need to develop a plan for pastureland use. For example, if you are planning to use your pasture from May 1 to August 30, divide the pastureland and schedule the grazing for a certain period on each of the divisions, using them on a 20-day rotation solely.

*What do herders have to consider when allocating pasture for different periods?*

Consider development phases of plants. Rotate pastures when plants are becoming bushy and have branches. Graze on a pasture for 10 days to let plants grow in the other pastures.



### *How do we develop a plan?*

1. *Develop a schedule for pastureland use.* Make a plan outlining which pasture to use from the end of May to the beginning of June and which to use when plants are actually growing. Based on this plan, you can then organize your schedule.
2. *Adhering to the plan.* Strictly follow the deadlines.
3. *Negotiate with the local government.* Introduce your work and plan to your bagh governor. For example, a herder tells a bagh governor that he is going to rest a certain pasture for 30 days from July 15. That request will be discussed during a bagh meeting. After making decisions, the governor will then issue a decree. This decree will also be discussed at meetings of soum representatives. That decree will also include the size, name, water supply and period. When the soum governor issues a decree, there will then be a law to rest the pasture.

### *How to rehabilitate deteriorated pasture*

There are two basic approaches to rehabilitating pasture, which are as follows:

- Superficial rehabilitation - Using the pasture according to schedule, with resting and rotation, as well as fencing and cutting weeds. Cut weeds when they blossom, which is about mid-July.
- General rehabilitation - This is basically changing the pasture by growing plants on it. This requires a lot of work.

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## Annex 8

### Translation of episode 12 "Chimdee the Iron", from the new 26-part educational TV drama entitled "Endless Labyrinth".

/Afternoon. Aimag center. Scene changes. Chimdee the Millionaire and Davaa are at the brick building which is being constructed. Scene changes/

**Chimdee:** /Frowning/ Ok Davaa, we need to speed up the construction process. What is that guy's name again? Khashaa! Where did he disappear to? All these construction workers are just sitting and doing nothing. Time is gold and the clock is ticking. It looks like we are going to open up our Repair Shop next year! /Looks at his watch/

**Davaa:** /Scratching back of his head with worries/ Well, you know. He probably is with my wife. They are doing some market research on what services and what price range our customers are interested in, what types of vehicles they have, what spare parts are most needed, things like that. They should be here soon.

**Chimdee:** /Sitting on stacked up construction materials/ Don't you see that my son can easily get this information from his friends? Don't waste time on such things. Where is that Tsogoo in such a difficult moment?

**Davaa:** Well, you must be right, but we have to find out who our potential customers are, before we plan what to do. We have to do what the customer pays for.

/Scene Changes. A car comes and stops next to them. Tsogoo and Khashaa come out of the car laughing. Khashaa is carrying a bag full of things. Chimdee throws away his cigarette and stands up with frustration/

**Tsogoo:** /Bows down respectfully to Davaa/ Master, wishing you the best of the day. Would you please bless your student? /Tries to kneel down/

**Davaa:** /Gets up and stands him up quickly, feeling nervous/ Fine, fine. Don't do this all the time.

**Chimdee:** Where have you been wandering around? I left you here to represent me because you are my brother. Why would you wander around all day with this lazy guy? Don't kneel down front of someone saying "Teacher, master"! Do you feel okay?

**Tsogoo:** /Looks around with surprised face/ I did not kneel down in front of someone to make you angry. Khashaa and I were not just wandering around doing nothing. We went to your office and waited for you because we did not want to talk about our business plans under this hot sun and in such a crowded place.

**Khashaa:** That's right. We concluded the few days of research results and discussed about how our business could be profitable and meet our customers' needs.

**Tsogoo:** /Raises up both of his hands as if he is praying/ Yes. Our research results show what drives customer's interests in purchasing services, demand based on their capacity to purchase and, furthermore, that their needs are limitless. Khashaa please show the study results to my brother and teacher.

/Scene changes. Khashaa empties the bag. Scene changes. There are broken things like a tea pot, a jug, a handless knife, scissors, a radio, a stereo and an electric stove. Scene changes. Chimdee and Davaa look shocked. Scene changes/

**Chimdee:** /With mouth dropped/ What are these?

**Tsogoo:** /Proudly/ This is the business for our Repair Shop.

**Chimdee and Davaa at the same time:** /Still surprised/ What?

**Tsogoo:** May be not everyone has a car, but everybody has something they use daily and they break.

**Chimdee and Davaa at the same time:** /still look surprised/ So what?

**Khashaa:** You know what, our aimag center needs a place that does repairs, not just for cars, but for home appliances, and also a place that manufactures agricultural machines and home equipment.

**Tsogoo:** /Interrupting/... that gives a guarantee. This town needs that kind of repair shop urgently. Look, /Picks up the iron/ even your iron is broken.

**Chimdee:** /Picks up the flat iron with his eyes swirling with anger and turned to Davaa/ Is this your idea? This is the business you taught them huh? I need a car repair shop /Swinging the iron in his hand/ not an iron repair shop. You got it!

/Scene changes. Chimdee turns to Tsogoo and Khashaa/ I asked you to do market research on services we could provide, not to collect waste scrap metals. Huh! I will make you understand that! /Tsogoo and Khashaa both run away. Scene changes/

/Scene changes. Evening. Outside of Davaa's ger. Inside of the ger, Dendev and Davaa are laughing while sipping a cup of tea. Jargal is nursing the baby on the bed. Scene changes/

**Dendev:** /Slapping his forehead while laughing/ That is why all day I heard people say that our boss, Chimdee the Millionaire, has become a Chimdee the Iron. He said "I asked you to do market research, not to collect waste metals" right? What a guy, ha, ha, ha.

**Jargal:** /While nursing the baby/ Truthfully, Tsogoo and Khashaa have done the right thing. Not everyone has a car. Isn't it true that home appliances like that break almost everyday! Plus, a lot of families have broken scoops, irons, and stereo players in their storerooms.

**Davaa:** Come on dear, you always say that operating a business is big work. I don't want to waste my time fixing a broken stereo.

**Dendev:** /Winked at Davaa/ That is right. In fact, women are the ones who are supposed to be maintaining such small home appliances. I know that Jargal does that, Right?

**Jargal:** /Indignantly/ Why do you men always consider us to be kitchen wives? You don't think I can do that? Set up a room for me at your car repair shop and send me to the city for a repair and maintenance training course. Then, I will be fixing several irons while you are still struggling with one car.

**Dendev:** /Laughing/ Please make sure that you fix our boss's iron first. Otherwise he is going to be Chimdee the Iron for a long time.

**Jargal:** /Feeling anger and confronted/ Ok, why not! Tomorrow I am going to attend a training course. I am sure I will be back by the time you finish your construction work.

**Davaa:** I hope you are not serious! Be sensible! What about the baby?

**Jargal:** You will know what to do. Just feed him from the bottle if he misses his mother's nursing. I feel that I am missing all the opportunities to learn and educate myself by being a housewife. I know that I can learn now. Nowadays women are holding important positions in the government. So, what am I doing here preparing your food and washing your dirty clothes, without having heard a single complementary word from your heart? Instead I am offended. You know what! I am going. Hey Mr. Dendev! While you are visiting families for fermented mare's milk and dairies, your wife is sweating in the heat and freezing in the cold at the market. /Scene changes. Dendev stops laughing and starts gulping his tea/

**Jargal:** It is okay if you can not support, or be a good companion to, your wife, but at least listen to her caring words. I hope you are not thinking that women know only about cooking on the stove and have no knowledge about business. Do you know that the owners of big companies like Petrovis and Altjin are women!

**Davaa:** /In a lower tone to calm her down/ Dear, please don't stress too much. We were just teasing you. You know what; it is a great idea to open up such a business next to our car repair shop. It is not necessary to send someone for training, instead hire someone who is specialized in this area and looking for work. Who knows how good that person can be? Just in case, we will send one of our people to the city for training in the future. It will attract more customers. I agree with what my wife said. We are going to be a repair shop, so why not be a super repair shop that fixes everything.

**Jargal:** /Gladly/ What do you think Chimdee the Millionaire would say? Would he agree?

**Davaa:** We will do the profit calculation based on Tsogoo and Khashaa's research and put it on his table. The numbers with several zeros will change his mind. Do you remember that when we were discussing about where to build the building for the repair shop, he would not agree on the location? He wanted to build it in the aimag center but when we explained to him that the location by the main

highway behind Tsengel is more profitable, advantageous, and cheap for advertisement and that people are used to going there for repairs, he agreed to it.

**Jargal:** /Putting the baby on a bed and starting to pour tea into the cup/ I know... but I could never understand why he was trying to build the repair shop in the aimag center. I would imagine that he would know better after all his business experience.

**Davaa:** May be he was doing the "one cut after measuring seven times". It looks like most business people tend to listen to other people's opinions and advice before making a decision. Instead of being a stubborn jack ass, they take their time observing and studying to see if other people are speaking the truth. I think that is the reason that they act like they do not agree with your opinion or idea. /Scene changes. Jargal listens while lighting up the fire/ I think that is why he participates and has all these meetings, seminar and appointments. Otherwise, he would carry all the burdens on his back and be pulling out all his hair.

**Dendev:** /Feeling uncomfortable/ Maybe other businessmen are like that. But I don't know if it is true about our boss.

**Davaa:** /surprisingly/ What is wrong with you? Why are you suddenly talking negatively about our boss? Are you worried and embarrassed that people would call you Chimdee the Iron's driver? I know it sounds better when you are called Millionaire's driver. /Smiles and gives Dendev a friendly pat on the shoulder. **Jargal:** /also smiles and puts some dairy products on the table, and says to Dendev:/ Come on, stop now. If you want to badmouth someone, badmouth me. Here, help yourself to some dairy products. I will prepare some food now. Taking care of this kid takes too much time. /Scene changes. Dendev is sitting there staring down like something is troubling him. Then he says/  
- I have to tell you something. I feel like betraying my boss Chimdee. He has not done anything bad to me but he is going to do it to you. Therefore, I feel that I have to tell you this.

/Scene changes. Jargal stops pouring water into the pot. Dendev also stops lighting his cigarette/

**Davaa:** /With a surprised look, still has his unlit cigarette between his lips/ What happened that is making you say such a thing?

**Dendev:** /With determined face/ Think of me anyway you would like. But I have to tell you this because I always wish the best for you. Here is why our boss wanted to build the repair shop in the aimag center. The land by the highway will not sell for a high price in the future. The land permission...

/Scene changes. Door opens and Millionaire Chimdee walks in. Dendev's face changes. Stop plan/

/The end/